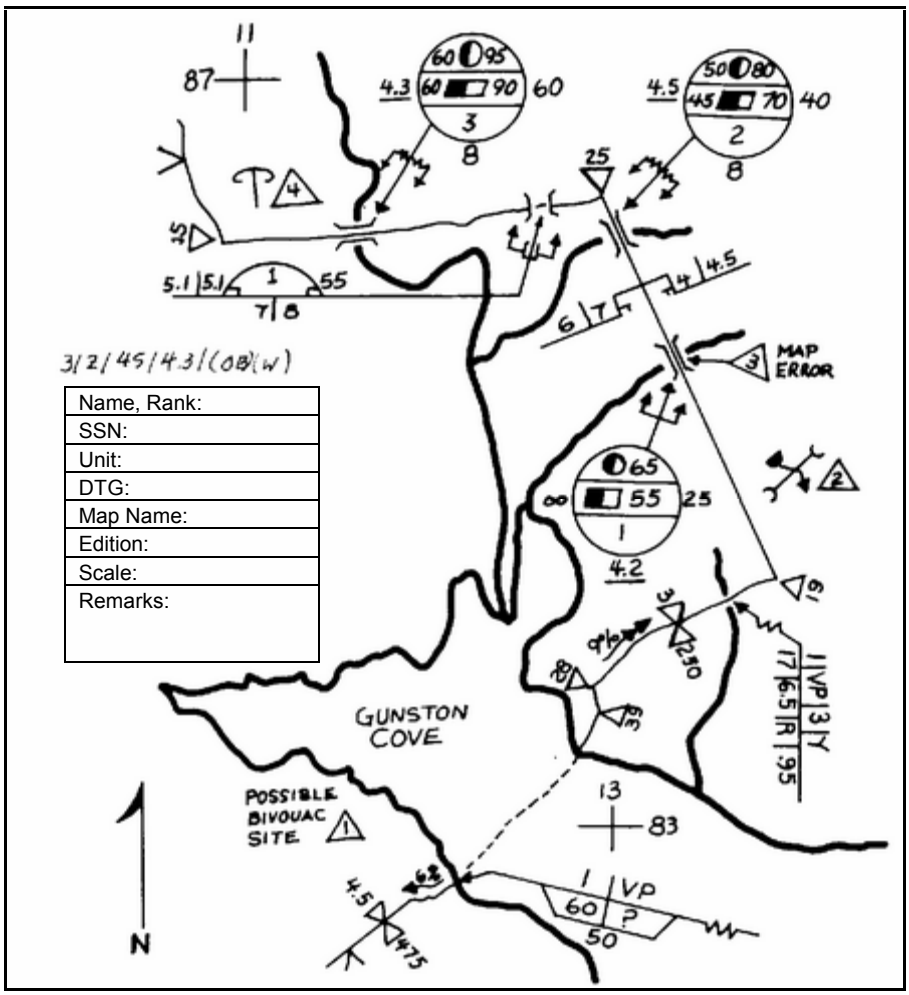
SUBCOURSE EN 5622 **EDITION A**

US ARMY ENGINEER SCHOOL

CONDUCT RECONNAISSANCE PART II



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CONDUCT RECONNAISSANCE
PART II

Subcourse EN 5622

EDITION A

United States Army Engineer School
Fort Leonard Wood, Missouri 65473

3 Credit Hours

Edition Date: August 2002

SUBCOURSE OVERVIEW

This subcourse is designed to provide the knowledge required to determine, calculate, and record route-limiting characteristics. This subcourse also describes how to prepare route reconnaissance forms and reports according to *FMs 5-34, 5-170, and 101-5-1.* Although this subcourse is developed at skill level 3, it is designed in a step-by-step format so that an individual without reconnaissance experience can successfully complete the course. Work must be accomplished in a manner consistent with environmental laws and regulations.

There are no prerequisites for this subcourse.

This subcourse reflects the current doctrine when this subcourse was prepared. In your work situation, always refer to the latest official publications.

Unless otherwise stated, the masculine gender of singular pronouns is used to refer to both men and women.

TERMINAL LEARNING OBJECTIVE:

ACTION:	You will determine, calculate, and record limiting characteristics for traffic on a route, and you will prepare reconnaissance forms and reports.
CONDITION:	You will be given the material in this subcourse and an Army Correspondence Course Program (ACCP) examination response sheet.
STANDARD:	To demonstrate competency of this task, you must achieve a minimum of 70 percent on the subcourse examination.

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ADMINISTRATIVE INSTRUCTIONS

1. Number of lessons in this subcourse: Two.

2. Materials you need in addition to this booklet are a number 2 lead pencil, paper, the ACCP examination response sheet, and the preaddressed envelope provided with this subcourse. A calculator is not mandatory but is suggested.

3. Supervisory requirements: None.

4. References: The following publications provide additional information about the material in this subcourse. You do not need these materials to complete this subcourse.

- Department of Army (DA) Form 1248. *Road Reconnaissance Report.* 1 July 1960.
- DA Form 1249. *Bridge Reconnaissance Report.* 1 July 1960.
- DA Form 1250. *Tunnel Reconnaissance Report.* 1 January 1955.
- DA Form 1251. *Ford Reconnaissance Report.* 1 January 1955.
- DA Form 1252. *Ferry Reconnaissance Report.* 1 January 1955.
- DA Form 1711-R. *Engineer Reconnaissance Report.* 1 May 1985.
- FM 5-34. *Engineer Field Data.* 30 August 1999.
- FM 5-34.343. *Military Nonstandard Fixed Bridging.* 12 February 2002.
- FM 5-170. *Engineer Reconnaissance.* 5 May 1998.
- FM 5-250. *Explosives and Demolitions.* 30 July 1998.
- FM 101-5-1. *Operational Terms and Graphics.* 30 September 1997.
- Soldier's Training Publication (STP) 5-12B24-SM-TG. *Soldier's Manual, Skill Levels 2/3/4 and Trainer's Guide, MOS 12B, Combat Engineer.* 12 December 1990.
- Standardization Agreement (STANAG) 2253. *Roads and Road Structures.* 17 May 2000.

GRADING AND CERTIFICATION INSTRUCTIONS

Examination: This subcourse contains a multiple-choice examination covering the material in the lessons. After studying the lessons and working through the practice exercises, complete the examination. Mark your answers in the subcourse booklet, and then transfer them to the ACCP examination response sheet. Completely blacken the lettered oval that corresponds to your selection (A, B, C, or D). Use a number 2 lead pencil to mark your responses. When you complete the ACCP examination response sheet, mail it in the preaddressed envelope provided with this subcourse. You will receive an examination score in the mail. You will receive three credit hours for successful completion of this examination.

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LESSON 1

ROUTE-LIMITING CHARACTERISTICS

Critical Tasks: 052-196-2002, 052-196-2004, 052-196-2101, 052-196-2103, and 052-196-3065

OVERVIEW

LESSON DESCRIPTION:

It is critical that the personnel conducting a route reconnaissance be capable of correctly calculating and reporting required information on a reconnaissance overlay. In this lesson, you will learn to determine, calculate, and record route-limiting characteristics for traffic.

TERMINAL LEARNING OBJECTIVE:

ACTION: You will learn to determine, calculate, and record route-limiting characteristics for traffic.

CONDITION: You will be given the material contained in this lesson.

STANDARD: You will correctly answer practice exercise questions at the end of this lesson.

REFERENCES: The material contained in this lesson was derived from the following publications: FMs 5-170 and 101-5-1, STANAG 2253, and STP 5-12B24-SM-TG.

INTRODUCTION

Route reconnaissance is used to gather information about enemy activities, obstacles (including chemical or radiological contamination), route conditions, and critical terrain features along a specific route. The techniques that are used and the requirements for a route reconnaissance are less time-consuming and are performed more rapidly than other types of reconnaissance. Two methods used for performing a route reconnaissance are—hasty and deliberate.

A hasty route reconnaissance is usually performed when required time and qualified personnel are not available. It is used to determine the immediate trafficability of a route for military traffic. A hasty reconnaissance report usually consists of an overlay,

supplemented by additional reports about various aspects of the terrain (as specified by ordering headquarters).

A deliberate route reconnaissance is performed when enough time and qualified personnel are available. It provides the necessary data for a thorough analysis and classification of significant terrain features along a route. Information about repair or demolition procedures is also reported. An overlay is used to show the exact location of each reconnoitered terrain feature. DA reconnaissance report forms are included with an overlay to establish a permanent record and to ensure that enough detail concerning important route characteristics is included.

PART A – SLOPES AND CURVES

Two land features that can present obstructions to military traffic are slopes and curves. Engineers must be able to report the correct information about these features.

1-1. Slopes. Slopes are usually referred to as steep or gentle, but these terms are too general for reconnaissance purposes. The slope of the ground seriously affects the speed at which vehicles or personnel can move. A more exact way to describe slope is needed to indicate the effect a given slope will have on traffic flow. All vehicles have limitations as to the steepness of slope that can be negotiated. Most vehicles that must negotiate a slope of 7 percent or greater for any significant distance will be slowed. Any slope that is 7 percent or greater is an obstruction. *STANAG 2253* requires proper recording of any slope that is 5 percent or greater. *Figure 1-1* shows the percent-of-slope symbols. Percent of slope is the ratio of the change in elevation (vertical distance to horizontal distance, multiplied by 100). Reconnaissance personnel can use several methods to calculate and report the percent of slope (Always round the answer up to the next whole number [symbolized by ♂]).

6 ↑	5 but less than 7 percent
9 ↑	7 but less than 10 percent
11 ↑	10 but less than 14 percent
17	14 percent and greater
NOTE: The arrows point uphill.	

Figure 1-1. Percent-of-Slope Symbols

a. The clinometer method is the easiest to perform. A clinometer is an instrument that directly measures the percent of slope. There are several variations in the Army inventory. This instrument is organic equipment for most engineer units.

b. When a clinometer is not available, use the percent-of-slope formula as shown in *Figure 1-2* along with the map or the pace method to find the correct values for the vertical and horizontal distance. The vertical distance (V_d) and the horizontal distance (H_d) must always be expressed in the same unit of measure.

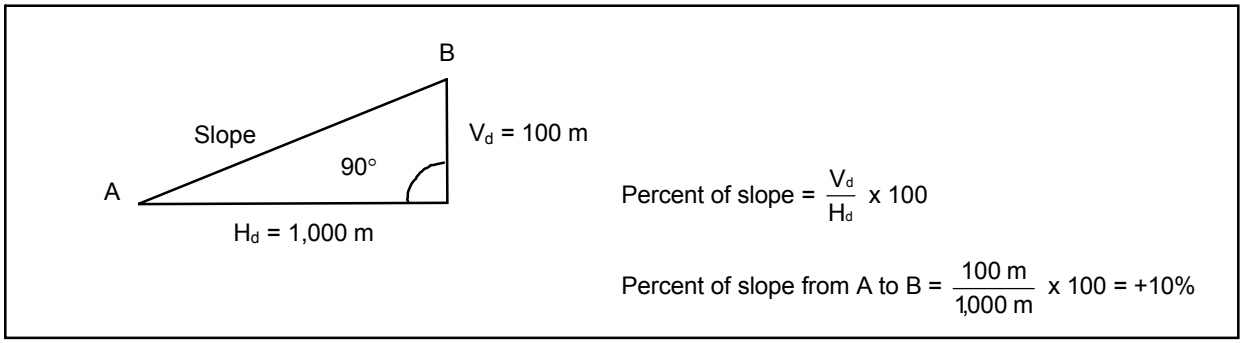


Figure 1-2. Percent-of-Slope Formula

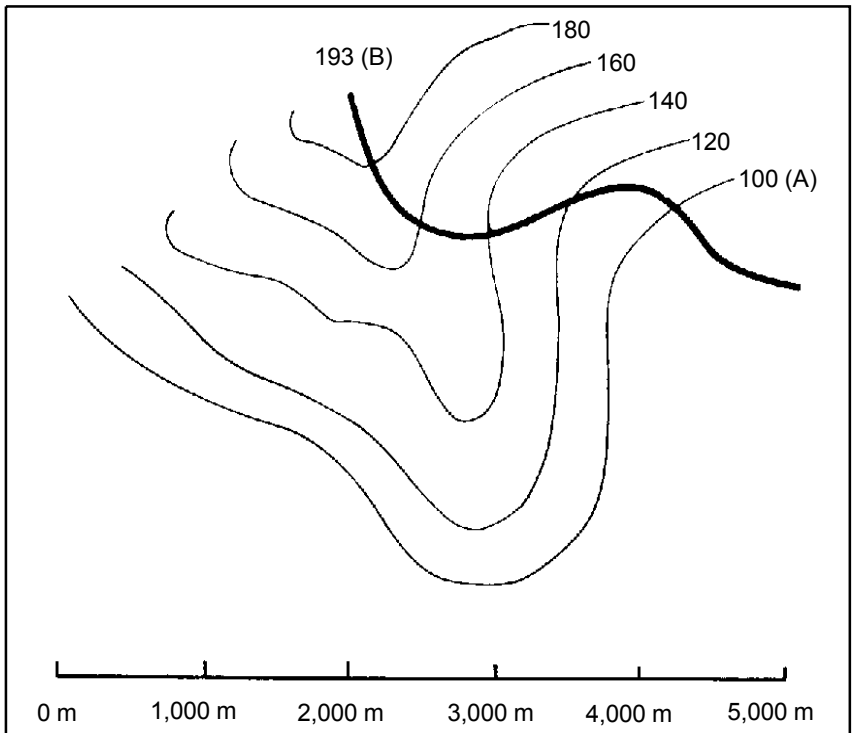
(1) A large-scale map (1:25,000) may be used to approximate the percent of slope. After the slope has been identified on the map, the difference in elevations between the top and bottom of the slope is found by reading the elevation contours or spot elevation. Then the horizontal distance is measured. Both of these values must be in the same unit of measure. The values obtained for horizontal and vertical distances are then substituted in the percent-of-slope formula and the percent of slope is computed. This method is not suitable where a cut or a fill has been used to reduce the gradient of the route. *Figure 1-3, page 1-4,* shows an example of using a large-scale map to determine the percent of slope on a route.

(2) The pace method relies on a soldier's line of sight to measure the vertical distance and pacing off the ground to measure the horizontal distance *(Figure 1-4, page 1-5)*. The average eye level is 1.75 meters above the ground. The average pace is 0.75 meter. These measurements should be accurately determined for each member of a reconnaissance team.

(a) With his head and eyes level, a soldier stands at the bottom of the slope. The soldier then sights a spot on the slope. This spot should be easily identified. If it is not, another member of the team may be sent forward to mark the location. The individual making the sighting then walks forward to the marked spot and records the number of paces. This procedure is repeated until the top of the slope is reached. The vertical distance is then computed by multiplying the number of sightings times the eye-level height. The horizontal distance is computed by multiplying the number of paces times the soldier's measured pace or 0.75 meter.

(b) The percent of slope can then be calculated by substituting the values into the percent-of-slope formula. Because this method considers horizontal

distance equal to incline distance, reasonable accuracy may be obtained only for slopes less than 30 percent.



Find V_d:

Spot elevation B	=	193 m
Spot elevation A	=	100 m
V_d	=	93 m

Find H_d:

Road distance from A to B	=	3,720 m

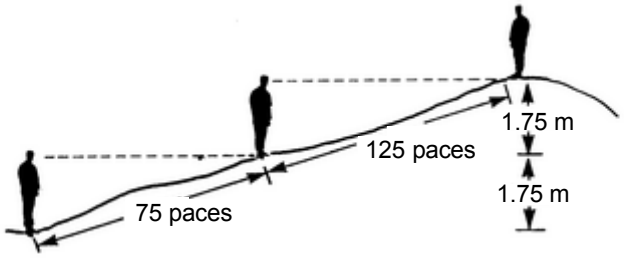
Calculate the percent of slope:

$$\frac{V_d}{H_d} \times 100 = \frac{93}{3{,}720} \times 100 = +2.5\% = ♂\ 3\%$$

Figure 1-3. Map Method to Determine the Percent of Slope

1-2. Curves. Curves are another land feature that must be considered by reconnaissance personnel as possible obstructions to traffic. The speed at which vehicles can move along a specified route is affected by curves.

a. For reconnaissance purposes, curves with a radius of curvature of 25 meters and less are considered obstructions to traffic flow and are indicated by the abbreviation OB in the route classification formula. Curves with a radius of curvature between 25.1 and 45 meters are reportable on an overlay but are not considered obstructions.



Given: Eye-level height = 1.75 m
Pace = 0.75 m

V_d = 2 x 1.75 m = 3.5 m
H_d = (75 paces + 125 paces) x 0.75 = 200 x 0.075 = 150 m

Percent of slope = $\frac{V_d}{H_d}$ x 100 = $\frac{3.5}{150}$ x 100 = 0.023 x 100 = +2.33% = ♂ 3%

Figure 1-4. Pace Method to Determine the Percent of Slope

b. Sharp curves along a specified route with a radius of 45 meters and less are represented on maps or overlays by a triangle. The vertex (the point opposite to and farthest from the base) of the triangle will point to the geographical location of the curve on the overlay or map. In addition, the measured value (in meters) for the radius of curvature is written outside the triangle. A series of sharp curves is represented by two triangles, one drawn inside the other. The vertex of the outer triangle points to the geographical location of the curve. The number of curves and the radius of curvature at the sharpest curve of the series are written outside the triangle *(Figure 1-5)*.

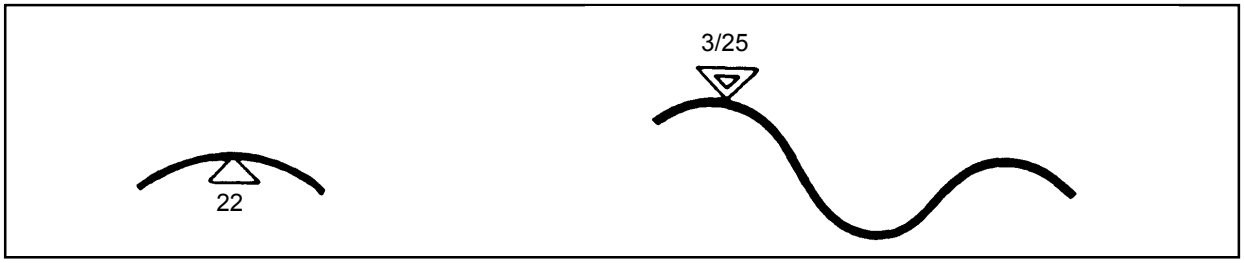


Figure 1-5. Curve Symbols

c. There are several methods that can be used to measure curves. These methods are discussed below.

(1) The radius of curvature may be estimated by using a tape to swing an arc (*Figure 1-6, page 1-6)*. The curve is inscribed as part of a circle by swinging an arc with a tape from an estimated center of a circle. The length of the tape from the center of the circle to its circumference is the radius of curvature.

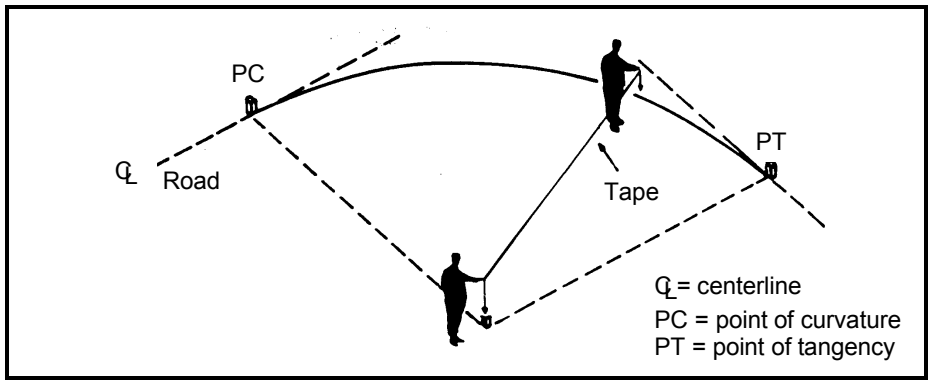


Figure 1-6. Using a Tape to Determine the Radius of Curvature

(2) Another method is to use the radius-of-curvature formula. Refer to the following formula and *Figure 1-7* (Always round your answer down to the next whole number):

$$R = \frac{c^2}{8 \times M} + \frac{M}{2}$$

where—

R = radius of curvature (always round down to the next whole number)

c = chord (sometimes referred to as tape) (the distance from the centerline of the road to the centerline of the road at the outer extremities of the curve)

8 = conversion and correction factor

M = median (the perpendicular distance from the center of the chord to the centerline of the road). A 90° angle must be formed at M and c.

2 = conversion and correction factor

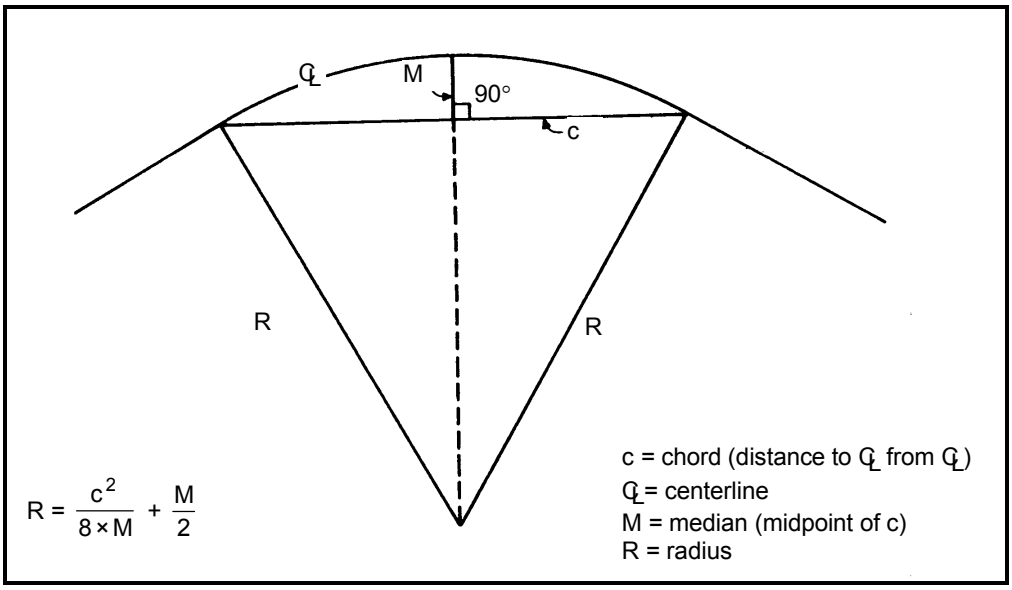


Figure 1-7. Using a Formula to Determine the Radius of Curvature

For example, if c is 15 meters and M is 2 meters, compute the radius of curvature as follows:

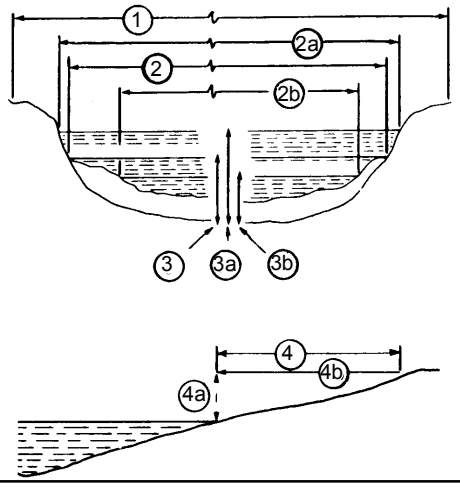
$$R = \frac{15^2}{8 \times 2} + \frac{2}{2} = \frac{225}{16} + 1 = 14.0625 + 1 = 15.0625 = 15 \text{ meters}$$

The result shows that the radius of curvature is an obstruction to traffic flow. The curve symbol is marked at the site of the curve on the map overlay, and OB is annotated in the route classification formula.

PART B – BODIES OF WATER

Bodies of water may also present obstructions to military traffic. Some of the information that needs to be gathered for bodies of water includes depth, width, velocity, composition of the stream bottom, and possible military water points.

1-3. Water Fractures. Because modern military vehicles have built-in stream-crossing capabilities, a commander can more efficiently conduct vehicular fording, swimming, and ferrying operations. To assist the commander, reconnaissance personnel locate and report stream-crossing sites that are likely to permit smooth traffic flow and reduce route obstructions as much as possible *(Figure 1-8)*.



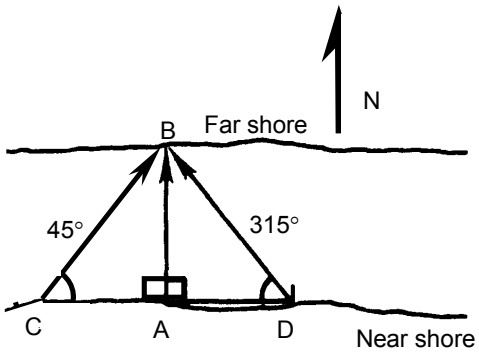
1. The width of the streambed from bank to bank.
2. The actual width of the water, measured at normal stage. The maximum width (2a) and the minimum width (2b) are estimated based on local observations or records of high water and low water.
3. The actual depth of the stream, measured at normal water level. The maximum water depth (3a) and the minimum water depth (3b) are estimated based on local observations or records.
4. The slope of the approach is the slope of the stream banks through which the approach roads are cut (4a is the approach elevation, and 4b is the approach distance).

Figure 1-8. Dimensions Required for Reporting Streams

a. Stream depth can usually be determined by using field-expedient devices (such as measured poles or weighted ropes). Depth readings are normally taken every 3 meters. In the event of a sudden heavy rainfall, depths must be checked at frequent intervals to provide warning of possible sudden flooding. The actual depth at the time of reconnaissance is recorded as the normal depth during a hasty reconnaissance.

b. Stream width can be measured using several methods. Measure short gaps by having a member of the reconnaissance team hold the end of a tape measure or rope on the near bank. Have another member of the team cross to the opposite bank and pull the tape

or rope tight. The length measured is the distance across the stream. This method is particularly useful during darkness when lights are not allowed. Another method is referred to as the left = add/right = subtract (LARS) method. The LARS method (also referred to as the compass method) is especially useful when the gap to be measured is wide. Use a compass to take the azimuth on the near shore, move left or right on a line forming a 90º angle with the azimuth. If you move to the left, add 45º and measure the distance from the start point to your current location. This distance is the same as the distance across the gap (*Figure 1-9)*.



A = the point on the near shore
AB = is the distance to be measured
B = the point on the far shore
C = the point that corresponds to the 45° offset
D = the point that corresponds to the 45° offset

EXAMPLE:
If azimuth of line AB = 0° (moving left, add 45°; moving right, subtract 45°)
Azimuth of line CB = 45°
Azimuth of line DB = 315°
Difference between azimuth AB and azimuth CB = 45°
Distance along AC or AD = distance along AB

Figure 1-9. Measuring the Stream Width With a Compass

c. The velocity of a current varies in different parts of a stream. The current is usually slower near the shore and swifter in the main channel. Perform the following steps to determine the stream velocity *(Figure 1-10)*:

Step 1. Measure a distance along the riverbank.

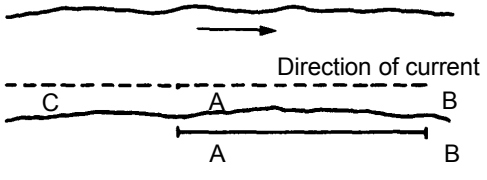
Step 2. Throw a light, floating object (not affected by wind) into the center of the stream.

Step 3. Record the time required for the object to travel the measured distance.

Step 4. Repeat this procedure at least three times.

Step 5. Use the average time of the test to compute the velocity (formula in *Figure 1-10)*.

Step 6. Convert the stream velocity to other units of measurement as required.



$$\text{Stream velocity (sec)} = \frac{\text{measured distance (AB) (m)}}{\text{float time (sec)}}$$

$$\text{Reported stream velocity} = \frac{\text{float time 1} + \text{float time 2} + \text{float time 3}}{3}$$

Figure 1-10. Determining the Stream Velocity

1-4. Water Supplies. There is usually no time to search for the best water when troops are in combat. Units must take whatever is available and purify it as needed. Reconnaissance personnel are responsible for helping commanders locate adequate water supplies. Engineers use the capacity-of-source (quantities) formula to determine the volume of streams, wells, or springs and the dimensions of lakes, with their rate of outflow. The amount of water that passes a point in 1 minute is calculated as shown in the example in *Figure 1-11*. The quantity of water is recorded on the reconnaissance overlay in conjunction with a critical point symbol. Critical point symbols and their uses are discussed later in this subcourse.

$Q = A \times V \times 48{,}000$

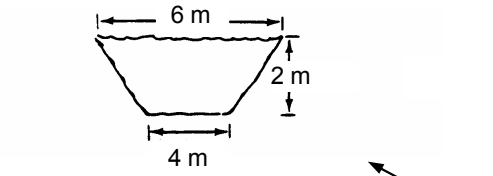
where—
Q = flow in liters per minute
A = cross section area of stream flow in square meters
V = velocity of the water in meters per second
48,000 = conversion and correction factor

$$A = \text{depth} \times \frac{\text{top width} + \text{bottom width}}{2} =$$

$$2 \times \frac{6+4}{2} = 2 \times 5 = 10 \text{ square meters}$$

$$V = \frac{AB\,(m)}{\text{time (sec)}} = \frac{5 \text{ m}}{10 \text{ sec}} = 0.2 \text{ meter per second}$$

$Q = 10 \times 0.2 \times 48{,}000 = 96{,}000$ liters per minute



Cross section area of a stream

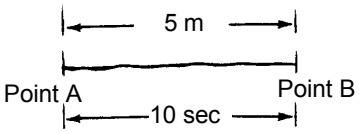


Figure 1-11. Example of Capacity-of-Source Formula

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LESSON 1

PRACTICE EXERCISE

The following items will test your grasp of the material covered in this lesson. There is only one correct answer to each item. When you complete the exercise, check your answers with the answer key that follows. If you answered any item incorrectly, study again that part of the lesson which contains the portion involved.

1. You have determined that the horizontal distance is 48 meters and the vertical distance is 4 meters on a particular slope. What is the percent of slope?

   A. 7
   B. 8
   C. 9
   D. 10

2. A member of your reconnaissance team has determined that the chord is 30 meters and the median distance is 6 meters on a particular curve. What is the radius of curvature?

   A. 18.75
   B. 22.75
   C. 21.75
   D. 22.00

3. Is a curve with a radius of curvature of 41 meters reportable on an overlay?

   A. Yes. It is reportable but is not considered an obstruction.
   B. Yes. It is reportable as an obstruction.
   C. No. It is not reportable.
   D. No. It is reportable but not on an overlay.

4. You are using the LARS method to determine the width of a stream. If you move right after shooting your first azimuth, what should you do to obtain your next azimuth?

   A. Subtract 45º
   B. Subtract 90º
   C. Add 45º
   D. Add 90º

LESSON 1

PRACTICE EXERCISE

ANSWER KEY AND FEEDBACK

Item		Correct Answer and Feedback
1.	C.	9 (paragraph 1-1b, page 1-3)
2.	B.	22.75 (paragraph 1-2c, page 1-5)
3.	A.	Yes. It is reportable but is not considered an obstruction. (paragraph 1-2a, page 1-4)
4.	A.	Subtract 45° (paragraph 1-3b, page 1-8)

LESSON 2

RECONNAISSANCE REPORTS

Critical Tasks: 052-196-3030, 052-196-3031, 052-196-3032, 052-196-3033, and 052-196-3035

OVERVIEW

LESSON DESCRIPTION:

In this lesson, you will learn how to prepare reconnaissance reports. You will also learn how to complete *DA Forms 1248, 1249, 1250, 1251, 1252, and 1711-R.*

TERMINAL LEARNING OBJECTIVE:

ACTION: You will prepare reconnaissance reports and forms.

CONDITION: You will be given the material contained in this lesson.

STANDARD: You will correctly answer practice exercise questions at the end of this lesson.

REFERENCES: The material contained in this lesson was derived from the following publications: DA Forms 1248, 1249, 1250, 1251, 1252, and 1711-R; FMs 3-34.343, 5-34, 5-170, 5-250, and 101-5-1; and STANAG 2253.

INTRODUCTION

The reconnaissance report forms are available through normal publication channels; however, short forms or work sheets for fieldwork may be designed and produced by the unit performing the reconnaissance. When completing DA reconnaissance forms, remember the following:

- Send the report to the headquarters identified in the heading blocks.
- Note information that is unknown or undetermined with a question mark.
- Record all information in metric units of measurement.

PART A – ROAD, BRIDGE, AND TUNNEL RECONNAISSANCE REPORTS

Reconnaissance forms were designed to provide the commander with detailed information on specific items along a route. These forms will generally support a deliberate reconnaissance. When used in conjunction with a route reconnaissance overlay, the commander will have a detailed description of an entire route.

2-1. Road Reconnaissance Report Form *(DA Form 1248).* A completed *DA Form 1248 (Figure 2-1* and *Figure 2-2, page 2-4)* provides information required for road classification. During a deliberate route reconnaissance, each road within the route is classified and a *DA Form 1248* is completed. Any item specified on the road reconnaissance report that is undetermined or unknown is represented by a question mark in the appropriate column of the form.

a. The heading blocks and blocks 1 through 8 are self-explanatory. If the traveled-way width varies, the upper and lower limits are shown in block 6.

b. Section II on the form shows detailed information about the road itself. If any features differ along the road, the differences are shown by placing additional notes in Section IV on the mileage chart *(Figure 2-2),* opposite the portion of the road to which it applies.

c. Obstructions are listed and described in Section III on the form. Locations of these obstructions will be recorded opposite the mileage chart *(Figure 2-2)*. Obstructions are further shown on an accompanying map or overlay by appropriate reconnaissance symbols.

2-2. Road Classification Formula. Like the route classification formula, the road classification formula is made up of numbers and symbols that express the characteristics of a portion of road. The road classification formula is annotated in Section IV on the form. The standardized order of the formula is limiting characteristics, width, surface materials, length, and obstructions (if applicable). The formula describes, in brief, the worst conditions on a portion of a road and is recorded on the mileage chart opposite the section of road it represents. Horizontal lines are drawn on the form to separate each portion of road that holds a separate classification.

a. Start the formula with an A if there are no limiting characteristics and with a B if limiting characteristics exist *(Table 2-1, page 2-5)*. If the symbol B is used, a corresponding letter symbol will be used to describe the limitation(s). An unknown or undetermined characteristic is represented by a question mark, together with the feature it represents, and both are enclosed in brackets.

b. The minimum traveled-way width is expressed in meters, followed by a slash and the combined traveled-way width, including the shoulders (for example, 14/16). To report a dual road (where the two traveled ways are narrowly separated by a fixed barrier, pavement, or turf centerline), the width of each traveled way is noted first, followed by the combined width, including the shoulders (for example, 7 + 7/18). If two traveled ways are significantly divided, each will be reported as a separate road.

ROAD RECONNAISSANCE REPORT

For use of this form, see FM 5-170; proponent agency is TRADOC.

DATE: 31 July 02

TO (Headquarters ordering reconnaissance): CDR 1st Engr Bn ATTN: S2

FROM: (Name, grade and unit of officer or NCO making reconnaissance): Douglas K.D. Merrill SFC, 1PLT, B/1st Eng Bn

1. MAPS	a. COUNTRY	b. SCALE	c. SHEET NUMBER OF MAPS	2. DATE/TIME GROUP (Of signature)
	Quantico, Virginia	1:50,000	5561-III	312047Jul02

SECTION I - GENERAL ROAD INFORMATION

3. ROAD GRID REFERENCE		4. ROAD MARKING (Civilian or Military number of road)	5. LENGTH OF ROAD (Miles or kilometers, specify)
FROM: UT122864	TO: UT097899	VA617	16.0 Km

6. WIDTH OF ROADWAY (Feet or meters, specify): 6.7 - 9.3 meters

8. WEATHER DURING RECONNAISSANCE (Include last rainfall, if known): Clear - Temp 85°; Last rainfall – Approx. 3 cm 10 June 02

7. RECONNAISSANCE

DATE	TIME
31 July 02	1630

SECTION II - DETAILED ROAD INFORMATION

(When circumstances permit more detailed information will be shown in an overlay or on the mileage chart on the reverse side of this form. Standard symbols will be used.)

9. ALINEMENT (Check one ONLY)

	(1) FLAT GRADIENTS AND EASY CURVES
	(2) STEEP GRADIENTS (Excess of 7 in 100)
	(3) SHARP CURVES (Radius less than 100 ft (30m))
✓	(4) STEEP GRADIENTS AND SHARP CURVES

10. DRAINAGE (Check one ONLY)

	(1) ADEQUATE DITCHES, CROWN/CAMBER WITH ADEQUATE CULVERTS IN GOOD CONDITION
✓	(2) INADEQUATE DITCHES, CROWN/CAMBER OR CULVERTS, ITS CULVERTS OR DITCHES ARE BLOCKED OR OTHERWISE IN POOR CONDITION

11. FOUNDATION (Check one ONLY)

✓	(1) STABILIZED COMPACT MATERIAL OF GOOD QUALITY		(2) UNSTABLE, LOOSE OR EASILY DISPLACED MATERIAL

12. SURFACE DESCRIPTION (Complete Items 12a and b)

a. THE SURFACE IS (Check one ONLY)

	(1) FREE OF POTHOLES, BUMPS, OR RUTS LIKELY TO REDUCE CONVOY SPEED	✓	(2) BUMPY, RUTTED OR POTHOLED TO AN EXTENT LIKELY TO REDUCE CONVOY SPEED

b. TYPE OF SURFACE (Check one ONLY)

	(1) CONCRETE		(6) WATERBOUND MACADAM
✓	(2) BITUMINOUS (Specify type where known): Asphalt		(7) GRAVEL
			(8) LIGHTLY METALLED
			(9) NATURAL OR STABILIZED SOIL, SAND CLAY, SHELL, CINDERS, DISINTEGRATED GRANITE, OR OTHER SELECTED MATERIAL
	(3) BRICK (Pave)		
	(4) STONE (Pave)		(10) OTHER (Describe):
	(5) CRUSHED ROCK OR CORAL		

SECTION III - OBSTRUCTIONS

(List in the columns below particulars of the following obstructions which affect the traffic capacity of a road. If information of any factor cannot be ascertained, insert "NOT KNOWN")

(a) Overhead obstructions, less than 14 feet or 4.25 meters, such as tunnels, bridges, overhead wires and overhanging buildings.
(b) Reductions in road widths which limit the traffic capacity, such as craters, narrow bridges, archways, and buildings.
(c) Excessive gradients (Above 7 in 100)
(d) Curves less than 100 feet (30 meters) in radius
(e) Fords

SERIAL NUMBER a	PARTICULARS b	GRID REFERENCE c	REMARKS d
1	Sharp Curve - Radius 27.5m	UT122869	See Overlay
2	Steep Grade - 8% - Uphill - East	UT115875	Length 300m
3	Narrow Bridge - TWW 5.0m	UT109879	See Bridge Report #1
4	Underpass - V.C. 4.05m	UT102883	See Overlay
5	Road Crater - 7.5m Wide	UT101884	See Eng. Recon. Report #1
6	Ford - Length 73m - Width 8.2m	UT100886	See Ford Report #1
7	Ferry - Vehicle	UT134830	See Ferry Report #1
8	Tunnel - Length 100m	UT098888	See Tunnel Report #1

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Figure 2-1. Road Reconnaissance Report, Front

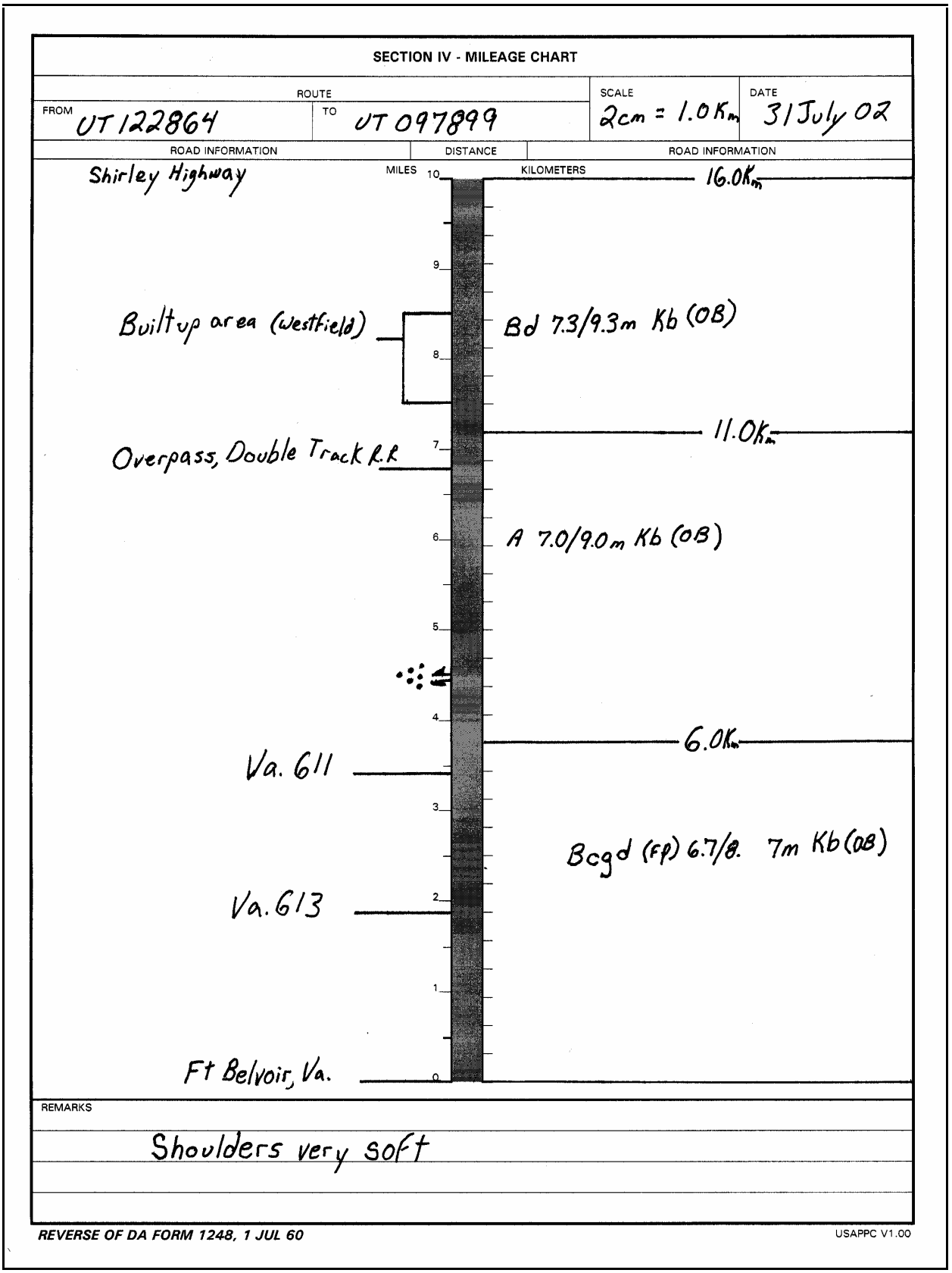


Figure 2-2. Road Reconnaissance Report, Reverse

Table 2-1. Criteria for the Determination of Limiting Characteristics

Limiting Characteristics	Criteria	Symbol
Sharp curves	Curves with a radius of curvature of 25 meters and less. Sharp curves are also reported as obstructions.	c
Steep gradients	Gradients with a percent of slope of 7 percent or steeper. Steep gradients are also reported as obstructions.	g
Poor drainage	Ditches, crown or camber, or culverts that are inadequate; ditches and culverts blocked or otherwise in poor condition.	d
Weak foundation	Foundation material that is unstable, loose, or easily displaced.	f
Rough surface	Surfaces that are bumpy, rutted, or potholed to an extent likely to reduce convoy speeds.	s
Excessive camber or super elevation	Crown or camber that is falling away so sharply as to cause heavy vehicles to skid or drag toward the shoulders.	j

c. The road surface material is the next symbol found in the road classification formula. The letter symbols that are used to represent road surface materials are shown in *Table 2-2*.

Table 2-2. Symbols for Road Surface Materials

Symbol	Material	Route Type
k	Concrete	Type X; generally heavy duty
kb	Bituminous (asphaltic) concrete (bituminous plant mix)	Type X; generally heavy duty
p	Paving brick or stone	Type X or Y; generally heavy duty
pb	Bituminous surface on paving brick or stone	Type X or Y; generally heavy duty
rb	Bitumen penetrated macadam, water-bound macadam with superficial asphalt or tar cover	Type X or Y; generally medium duty
r	Water-bound macadam, crushed rock or coral, or stabilized gravel	Type Y; generally light duty
l	Gravel or lightly metalled surface	Type Y; generally light duty
nb	Bituminous surface treatment on natural earth, stabilized soil, sand clay, or other select material	Type Y or Z; generally light duty
b	Undetermined types of bituminous material	Type Y or Z; generally light duty
n	Natural earth stabilized soil, sand clay, shell, cinders, disintegrated granite, or other select material	Type Z; generally light duty
v	Various other types of material not mentioned above	Classify X, Y, or Z depending on the type of material used (indicate the distance along the route)

d. The length of the road is represented next in the sequence and is expressed in kilometers. The length of the specific section of road may be shown in brackets at the end of the formula. This is not required and is optional for the reconnaissance team leader.

e. Obstructions along a road are indicated by the symbol OB at the end of the formula. Details of the obstructions are shown in Section III on the *DA Form 1248* and on the accompanying overlay. Obstructions to be reported include the following:

- Overhead obstructions (such as bridges, tunnels, underpasses, overhead wires, and overhanging buildings) with an overhead clearance of less than 4.3 meters.
- Reduction in traveled-way widths that are below standard minimums prescribed for the type of traffic flow *(Table 2-1, page 2-5)* (such as bridges, tunnels, craters, lanes through mined areas, and projecting buildings or rubble).
- Gradients (slopes) of 7 percent or greater.
- Curves with a radius of curvature of 25 meters and less *(STANAG 2253)*.
- Ferries.
- Fords.

f. Regular, recurrent, and serious blockage from the effects of snow or flooding are represented in the road classification formula. The symbol T (for snow blockage) and/or the symbol W (for flooding) follows the road classification formula. In the case where the conditions for snow and flooding both exist, a T and a W follows the route classification formula.

g. Usage and proper sequence of presentation are shown in the following examples of the road classification formula:

- **A 5.0/6.2 k.** This formula describes a road with no limiting characteristics or obstructions, a minimum traveled-way width of 5 meters, a combined traveled-way and shoulder width of 6.2 meters, and a concrete surface.
- **B g s 4/5 l (OB).** This formula describes a road with limiting characteristics of steep gradients and a rough surface, a minimum traveled-way width of 4 meters, a combined traveled-way and shoulder width of 5 meters, a gravel or lightly metalled surface, and with an obstruction.
- **B c (f?) 3.2/4.8 p (4.3 km) (OB) (T).** This formula describes a road with limiting characteristics of sharp curves and unknown foundation, a minimum traveled-way width of 3.2 meters, a combined traveled-way and shoulder width of 4.8 meters, a paving brick or stone surface, a route length of 4.3 kilometers, with an obstruction, and subject to snow blockage.
- **A 7 + 7/20 k.** This formula describes a dual road. Each traveled way is 7-meters wide, and the overall width is 20 meters (including the shoulders). It has a concrete surface and no limiting factors.

2-3. Bridge Reconnaissance Report Form *(DA Form 1249).* A *DA Form 1249* supplements the route reconnaissance overlay. For each bridge encountered during a deliberate reconnaissance, instructions will be given to the reconnaissance party as to the amount of detail required. Elements of bridge information are recorded in meters *(Figures 2-3 and 2-4, pages 2-8 and 2-9).* Any item of information that is unknown is shown by a question mark in the appropriate column of the report.

a. The heading information is self-explanatory. Complete the information as identified.

b. The assigned serial number of the bridge is entered in column 1. This number matches the serial number used in the bridge symbol on the route reconnaissance overlay.

c. The bridge location is entered in column 2. The location is stated in means of universal transverse Mercator (UTM) grid coordinates.

d. The horizontal clearance is entered in column 3. The horizontal clearance is the clear distance between the inside edges of the bridge structure, measured at a height of 0.3 meter above the surface of the traveled way and upwards. The horizontal clearance for truss bridges, tunnels, and underpasses, however, is measured from 1.21 meters above the traveled way. Any horizontal clearance less than the minimum required for the roadway width of the bridge is underlined. Unlimited horizontal clearance is indicated by the symbol for infinity (∞).

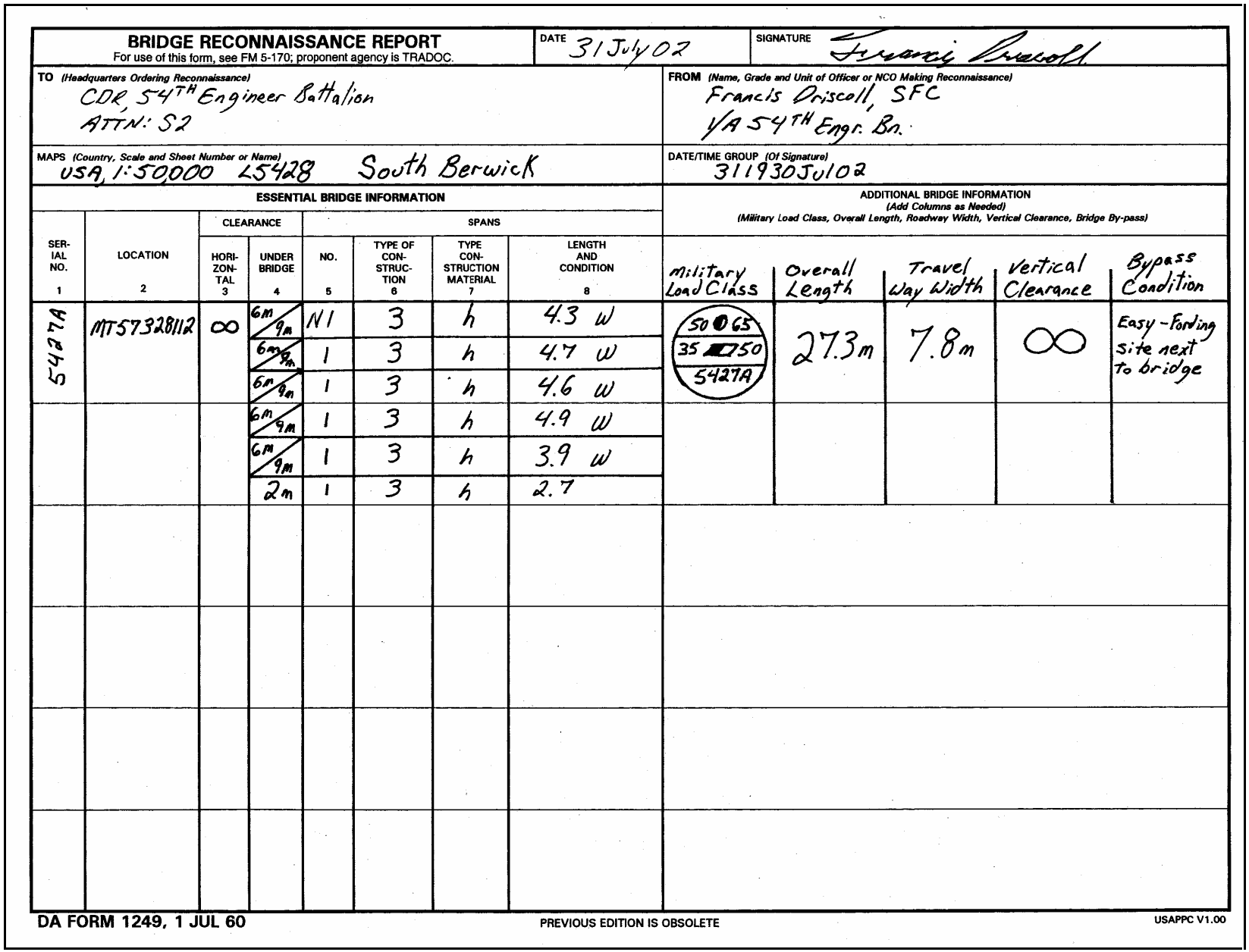
e. The under-bridge clearance is entered in column 4. The under-bridge clearance is the minimum clear distance between the underside of each span and the surface of the ground or water. The height above the streambed and the height above the estimated normal water level, pertaining to the appropriate bridge type, is entered for each span.

f. Each span is listed (in sequence starting from the west) in column 5. If the orientation of the bridge is due north and south, or so close to north and south that it is not certain which is the most westerly span, the abbreviation for north (N) is inserted in column 5 before the span, and the spans are listed in sequence, starting from the north.

g. The type of span construction is recorded by a number symbol in column 6. Refer to *Figures 2-5 and 2-6, page 2-10, and Table 2-3, page 2-11,* for the symbols.

h. The type of construction material of each span is recorded by a letter symbol in column 7. Refer to *Table 2-4, page 2-11,* for the symbols.

i. The span length is recorded in column 8. Span length is the center-to-center distance between bearings; therefore, the sum of the span lengths may not equal the overall length. Indicate spans which are not usable because of damage or destruction by putting the # symbol after the span length dimension. Spans that are over water are indicated by placing the letter W after the span length dimension.



BRIDGE RECONNAISSANCE REPORT
For use of this form, see FM 5-170; proponent agency is TRADOC.

DATE: 31 July 02

SIGNATURE: Francis Driscoll

TO *(Headquarters Ordering Reconnaissance)*: CDR, 54TH Engineer Battalion
ATTN: S2

FROM *(Name, Grade and Unit of Officer or NCO Making Reconnaissance)*: Francis Driscoll, SFC
V/A 54TH Engr. Bn.

MAPS *(Country, Scale and Sheet Number or Name)*: USA, 1:50,000 L5428 South Berwick

DATE/TIME GROUP *(Of Signature)*: 311930Jul02

ESSENTIAL BRIDGE INFORMATION

SERIAL NO. 1	LOCATION 2	CLEARANCE HORIZONTAL 3	CLEARANCE UNDER BRIDGE 4	SPANS NO. 5	SPANS TYPE OF CONSTRUCTION 6	SPANS TYPE CONSTRUCTION MATERIAL 7	SPANS LENGTH AND CONDITION 8
5427A	MT5732812	∞	6m/9m	N1	3	h	4.3 W
			6m/9m	1	3	h	4.7 W
			6m/9m	1	3	h	4.6 W
			6m/9m	1	3	h	4.9 W
			6m/9m	1	3	h	3.9 W
			2m	1	3	h	2.7

ADDITIONAL BRIDGE INFORMATION
(Add Columns as Needed)
(Military Load Class, Overall Length, Roadway Width, Vertical Clearance, Bridge By-pass)

Military Load Class	Overall Length	Travel Way Width	Vertical Clearance	Bypass Condition
50 ● 65 35 ■ 50 5427A	27.3m	7.8m	∞	Easy-Fording site next to bridge

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Figure 2-3. Bridge Reconnaissance Report, Front

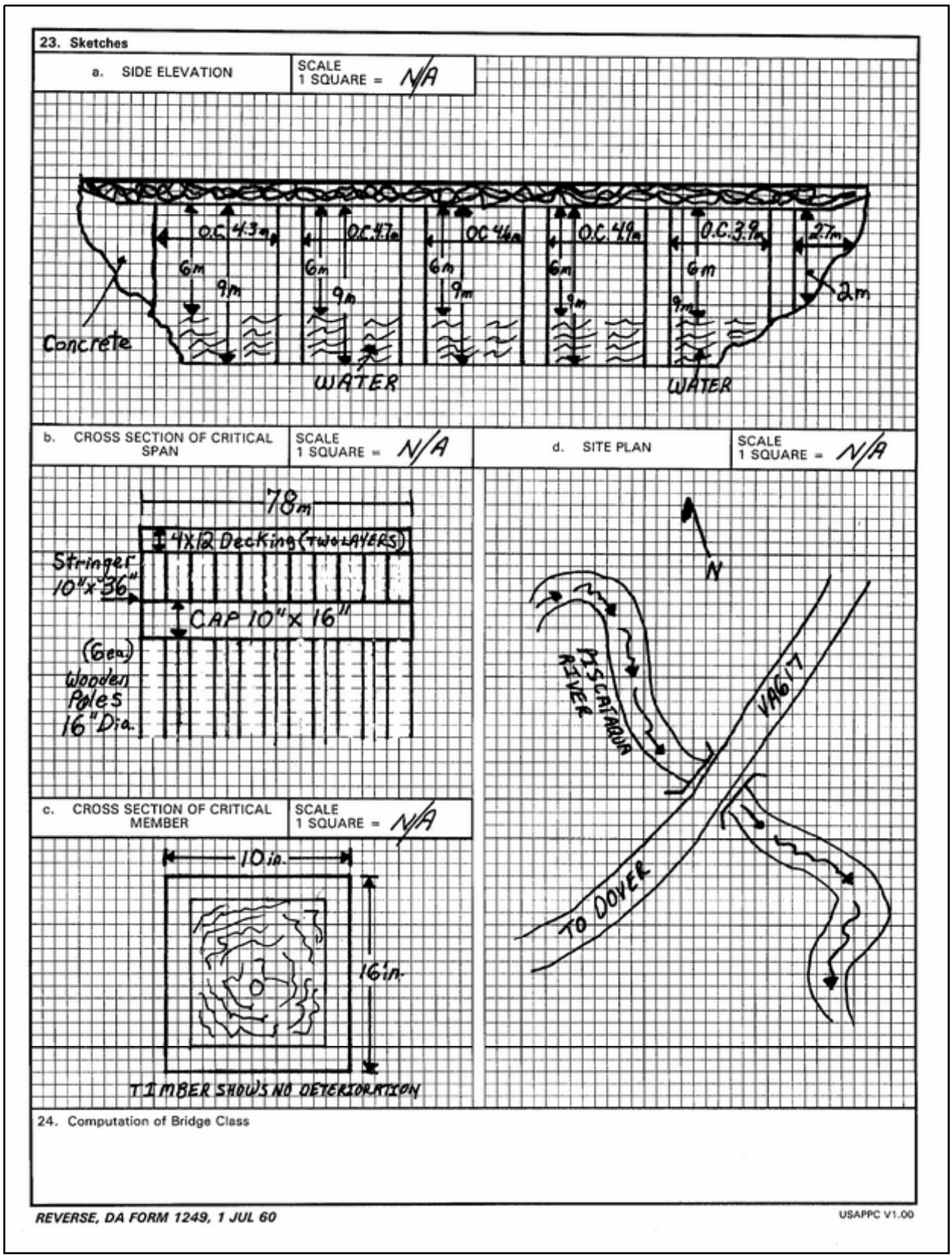


Figure 2-4. Bridge Reconnaissance Report, Reverse

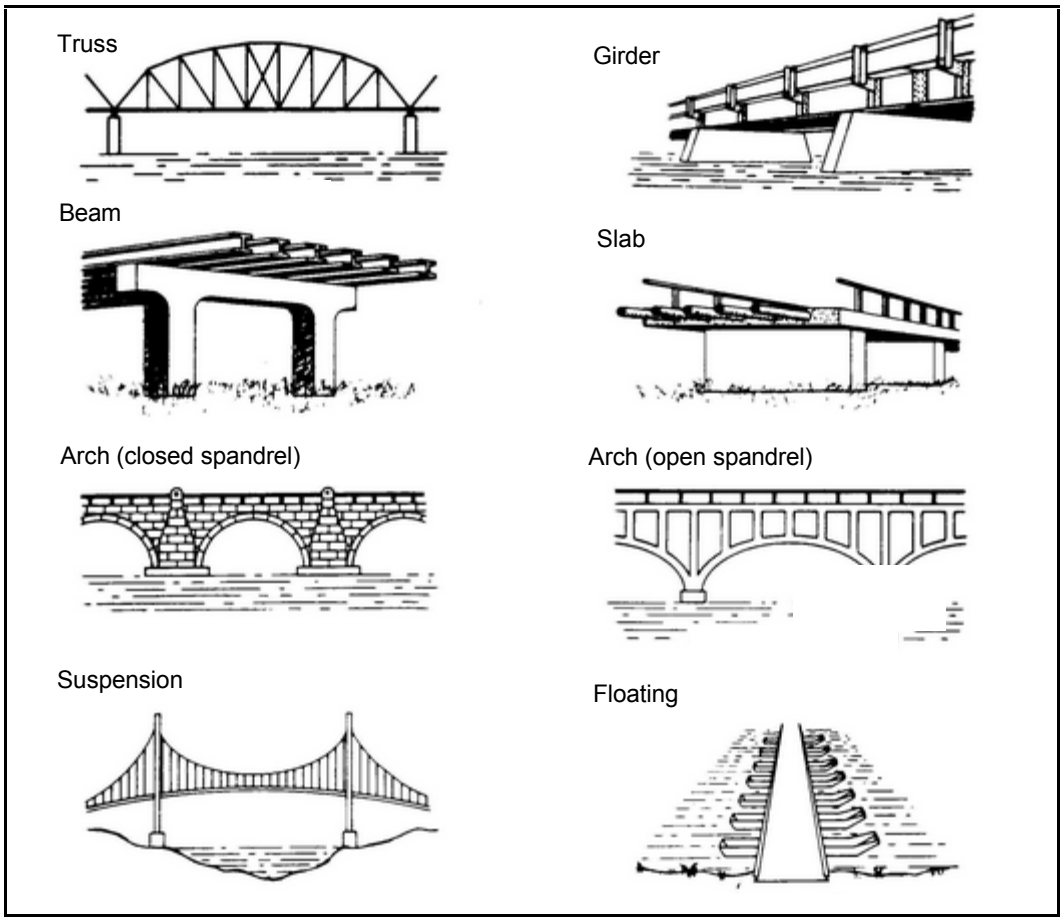


Figure 2-5. Typical Bridge Spans

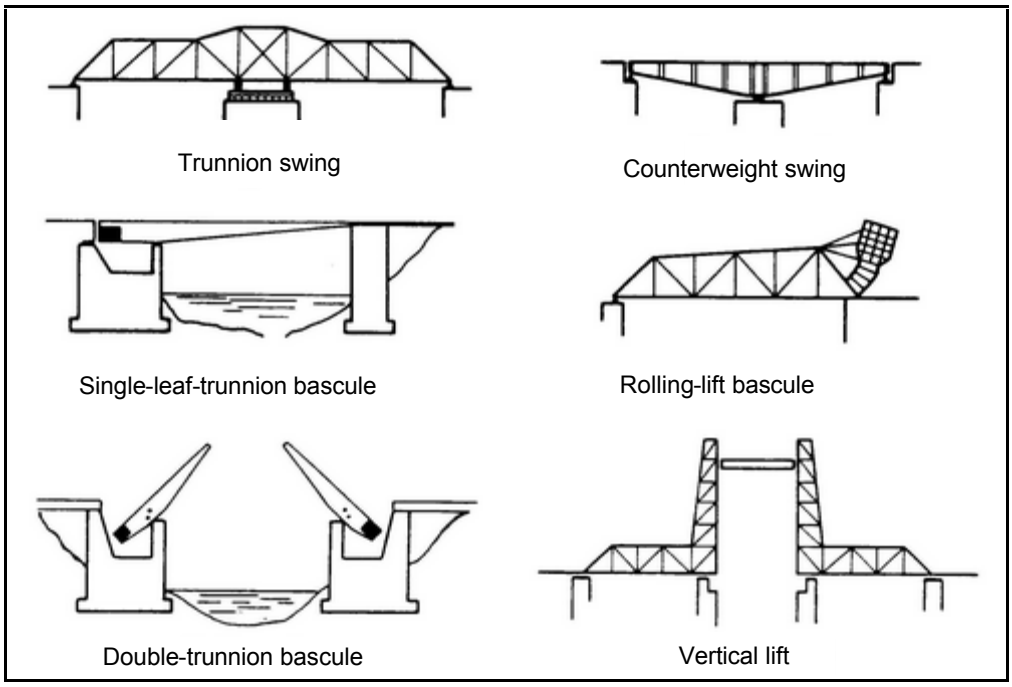


Figure 2-6. Typical Movable Bridges

Table 2-3. Span Type Symbols

Type of Span Construction	Number Symbol
Truss	1
Girder	2
Beam	3
Slab	4
Arch (closed spandrel)	5
Arch (open spandrel)	6
Suspension	7
Floating	8
Swing	9
Bascule	10
Vertical lift	11
Other (to be specified by name)	12

Table 2-4. Construction Material Symbols

Material of Span Construction	Letter Symbol
Steel or other metal	a
Concrete	k
Reinforced concrete	ak
Prestressed concrete	kk
Stone or brick	p
Wood	h
Other (to be specified by name)	o

j. When the abbreviated bridge symbol is used or when the reconnaissance mission requires it, columns are added to give the military load classification (MLC), the overall length, the roadway width, the overhead clearance, bypass condition and type (state condition as easy, difficult, or impossible), and remarks *(Figure 2-3, page 2-8)*. Include any further important details of the bridge (such as damage, preparation for demolition, effort to repair, and elaboration of information given under other column headings).

k. Details of railway bridges may be included on the bridge reconnaissance report. The letters RL are added after the serial number in column 1. Details of the work required to convert the bridge for use by road vehicles are listed under the "additional bridge information" block.

2-4. Bridge Sketches. Sketches can be made on the reverse side of *DA Form 1249* to show as much information as necessary *(Figure 2-4, page 2-9)*. Several important details that must be shown on a bridge sketch are discussed below.

a. A side elevation should be sketched to show the general features of the bridge, including the number of spans, piers, abutments, and their types and construction materials. Critical dimensions (such as span length, height above streambed, water level, and panel length) should also be noted. A cross section of the stream or gorge may also be included in the sketch.

b. The critical span (the span with the least load-carrying capacity) should be sketched in cross section. The sketch should show enough bridge construction detail to compute the MLC and to determine maintenance, reinforcement, and demolition needs. Such items as span width, type, construction material, and structural design should be included. *Tables 2-5 and 2-6* outline the required dimension measurements for each of the seven basic spans types. Measure these features and record them on the reverse of *DA Form 1249*.

Table 2-5. General Dimensions Required on the Seven Basic Bridges

Dimension Data	Simple Stringer	Slab	T beam	Truss	Girder	Arch	Suspension
Overall length	x	x	x	x	x	x	x
Number of spans	x	x	x	x	x	x	x
Span length	x	x	x	x	x	x	x
Panel length	—	—	—	x	—	—	x
Height above streambed	x	x	x	x	x	x	x
Height above estimated normal water level	x	x	x	x	x	x	x
Traveled-way width	x	x	x	x	x	x	x
Overhead clearance	—	—	—	x	—	—	x
Horizontal clearance	x	x	x	x	x	x	x
x = a required dimension							

c. Cross sections of critical members should be sketched on the reverse of *DA Form 1249*. Include enough detail to calculate the strength of the individual members.

d. The site plan sketch should show the location of the bridge; the alignment of the bridge relative to approaches; the gap or obstacle spanned; the location of unusual features (such as damage or obstructions); the classification, dimensions, and gradient of approaches; the direction of stream flow; and enough topographical detail of the barrier to indicate possible fording sites.

2-5. Bridge Photographs. Up-to-date photographs should accompany the *DA Form 1249*, if possible. Ground and aerial photographs are desirable. The minimum photographic coverage should include a side view, a view from the traveled way of the bridge, and a view of the underside of the bridge.

Table 2-6. Capacity Dimensions Required on the Seven Basic Bridges

Capacity Dimension Data	Simple Stringer					Slab	T beam	Truss	Girder	Arch	Suspension
Thickness of wearing surface	x					x	x	x	x	x	x
Thickness of flooring, deck, or depth of fill at crown	x					x	x	x	x	x	x
	Timber		Steel								
	Rectangular	Log	I beam	Channel	Rail						
Distance (center to center) between T beams, stringers, or floor beams	x	x	x	x	x	—	x	x	x	x	x
Number of T beams or stringers	x	x	x	x	x	—	x	x	x	—	x
Depth of each T beam or stringer	x	b	x	x	x	—	x	x	x	—	x
Width of each T beam or stringer	x	—	c	c	c	—	x	x	x	—	x
Thickness of web of I beams, WF beams, channels, or rails	—	—	x	x	x	—	—	x	x	—	x
Sag of cable	—	—	—	—	—	—	—	—	—	—	x
Number of each size of cable	—	—	—	—	—	—	—	—	—	—	x
Thickness of arch ring	—	—	—	—	—	—	—	—	—	x	—
Rise of arch	—	—	—	—	—	—	—	—	—	x	—
Diameter of each size of cable	—	—	—	—	—	—	—	—	—	—	x
Depth of plate girder	—	—	—	—	—	—	—	—	x	—	—
Width of flange plates	—	—	—	—	—	—	—	—	x	—	—
Thickness of flange plates	—	—	—	—	—	—	—	—	x	—	—
Number of flange plates	—	—	—	—	—	—	—	—	x	—	—
Depth of flange angle	—	—	—	—	—	—	—	—	x	—	—
Width of flange angle	—	—	—	—	—	—	—	—	x	—	—
Thickness of flange angle	—	—	—	—	—	—	—	—	x	—	—
Depth of web plate	—	—	—	—	—	—	—	—	x	—	—
Thickness of web plate	—	—	—	—	—	—	—	—	x	—	—
Average thickness of flange	—	—	x	—	—	—	—	—	—	—	—

b = diameter
c = width of flange
x = a required dimension

2-6. Additional Bridge Information. The following bridge information should be collected and recorded if possible. Some items may have already been mentioned.

- Approaches, including limiting factors, minimum traveled-way width, surface material, and obstructions.

- The geographic feature (and its width and depth) that the bridge spans.

- Current conditions, width and depth at the mean water level, tidal conditions, flood susceptibility, location of dams and locks, nature and slope of banks, and the type of stream bottom if the crossing is over a water obstacle.

- Abutments, including foundation conditions, type and material of construction, and bearing areas.

- Intermediate supports, including foundation conditions, type and material of construction, bearing areas, height aboveground or mean water level, horizontal clearance between supports at ground or mean water level, special design features (such as ice breakers), and critical dimensions required for demolition or classification calculations.

- Bridge structure, including a detailed description of the type and material of construction, wearing surface, deck or flooring, and supporting members. Also include capacity dimensions if applicable *(Table 2-6, page 2-13)*; engines and machinery for swing, lift, bascule, and retractile bridges; supply, utility, or communication lines supported by the bridge; date of construction; critical dimensions of demolition; and the MLC calculation *(Appendix B, FM 5-170)*.

- Repair information, including a description of the nature of repair or the reinforcement needed; an estimate of time, labor, and material required; availability of construction material nearby; and results to be expected from repairs or reinforcement. Extensive repair information is recorded on a *DA Form 1711-R* and is attached to the *DA Form 1249*.

- Demolition information, including a description of the demolition procedures planned and the expected effect; a description of any prior preparation; and an estimate of time, labor, and material required *(FM 5-250)*.

- Alternate crossing sites, including data concerning the approaches; crossing type (ferry, ford, or floating bridge); and an estimate of time, labor, and materials required to construct the alternate crossing.

2-7. Tunnel Reconnaissance Report Form *(DA Form 1250)*. The *DA Form 1250* is used to report detailed tunnel information obtained from a reconnaissance *(Figures 2-7 and 2-8, pages 2-16 and 2-17)*. A tunnel reconnaissance determines essential information such as the serial number, location, type, length, width (including sidewalks), bypasses, alignment, gradient, and cross section of a tunnel. Information is recorded on the tunnel reconnaissance report as follows:

- **Items 1 through 11.** Enter all information that establishes positive identification of the tunnel by route number, route location, map series and sheet number, grid reference, tunnel number, tunnel type, and geographic reference name. This portion is self-explanatory.

- **Items 12 through 17.** Enter the overall tunnel dimensions as indicated in *Figure 2-9, page 2-18*. Also include this information for any tunnels that branch off the main tunnel.

- **Items 18 through 21.** Enter the type of lining material, portal material, ventilation, and drainage. Include in Item 21, any available lighting facilities (if none, so state).

- **Items 22 through 29.** Enter special considerations, such as whether the tunnel is chambered for demolition, the date of tunnel completion, and the tunnel's present condition. Include bypass possibilities; the gradient and passability of approaches; in-tunnel restrictions; and any geological information pertinent to maintenance, improvement, or safety.

- **Items 30 through 32.** Draw a plan, a profile, a portal view, and a cross section of the bore. The plan should include the geographic positioning of the tunnel, approach routes, terrain features in the immediate area of the tunnel with emphasis on special features that affect possible bypasses, and tunnel alignment (including straight sections, angles, and curves). The profile should show the gradient to and from the tunnel, the gradient of the tunnel floor (designating any change in grade), and the relation of the tunnel to the terrain through which it passes. The portal view should show the mouth of the tunnel, the construction material, its position in relation to the surrounding terrain, and a limited section of the approach route. The cross section of the tunnel bore should include detailed information regarding the allowable traffic width, the shape of the bore as it may affect load heights and widths, and possible man-made or natural obstructions.

- **Item 33.** Include any pertinent information not previously mentioned, and attach appropriate photographs, if available.

TUNNEL RECONNAISSANCE REPORT
For use of this form, see FM 5-170; proponent agency is TRADOC.

DATE: 3 July 02

TO: *(Headquarters ordering reconnaissance)*
Commander, ATTN: S-2
9TH Engineer Battalion

FROM: *(Name, grade and unit of reconnaissance officer)*
Ralph Bandani
Ralph Bandani, SFC, Co B, 9TH Eng Bn

1. ROUTE OR LINE		2. FROM *(Initial Point)*	3. TO *(Terminal Point)*	4. DATE/TIME *(Of signature)*
HIGHWAY: Autobahn 70	RAILROAD: N/A	PV53526118	PV54802635	031835JUL02

5. MAP SERIES NR	6. SHEET NUMBER	7. GRID REFERENCE		8. TUNNEL NUMBER
		TYPE	COORDINATES	
V529	5327II	1,50,000	PV53942624	T-1

9. LOCATION FROM NEAREST TOWN			10. TYPE *(Subaqueous, Rock, Soil)*
DISTANCE	DIRECTION	NAME OF NEAREST TOWN	
15 Km	W	Schweinfurt	Rock

11. NAME *(Mountain or Water feature)*	12. LENGTH	13. NUMBER OF TRACKS	14. ROADWAY WIDTH
Röhn Mountain Range	200m	N/A	7.5

15. CLEARANCE		16. GRADE *(Percent)*	17. ALINEMENT *(Straight or radius of curve)*
VERTICAL	HORIZONTAL		
10m	8m	1%	

18. LINING *(Material)*	19. PORTALS *(Material)*	20. VENTILATION *(Type)*
Concrete	Stone	Natural

21. DRAINAGE
Excellent

22. CHAMBERED FOR DEMOLITION	23. COMPLETED *(Year)*	24. CONDITION *(Check appropriate box)*
☒ YES ☐ NO	1957	☒ EXCELLENT ☐ GOOD ☐ FAIR ☐ POOR

25. BYPASSABILITY
Easy East and West side via Town exits on highway

26. ALTERNATE CROSSING
Ehrlick St. to Autobahn 70

27. APPROACHES
Good 0% Entrance, 0% Exit

28. IN-TUNNEL RESTRICTIONS
Not to be used for Double-Flow Tracked Vehicles because Traveled-Way Width is not to standard.
No Lighting in tunnel.

29. GEOLOGIC DATA
Possibility of slides at west entrance on south side of roadway. 10m Retaining wall will alleviate question of traffic hinderance.

DA FORM 1250, JAN 55 USAPPC V1.00

Figure 2-7. Sample Tunnel Reconnaissance Report, Front

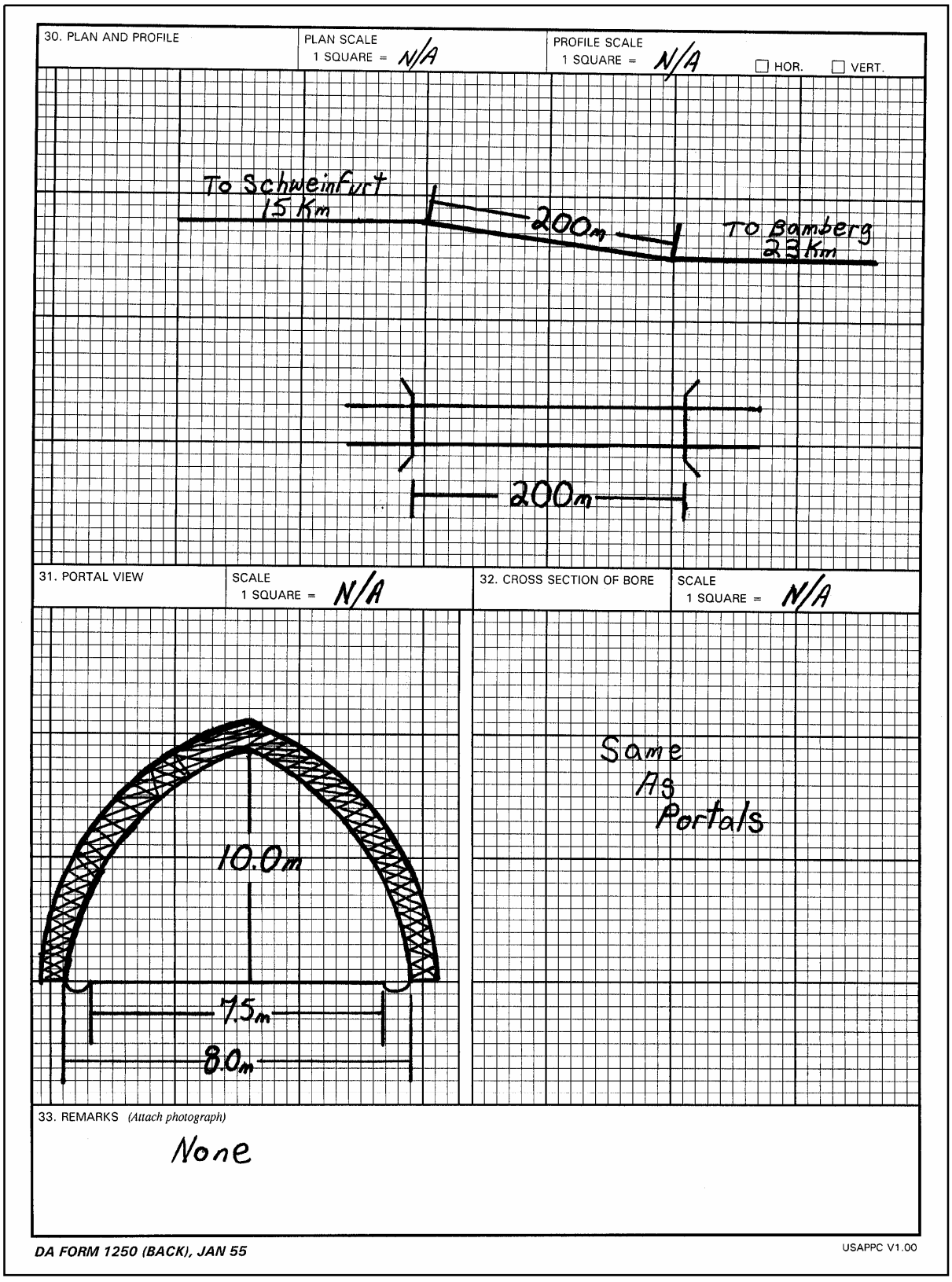
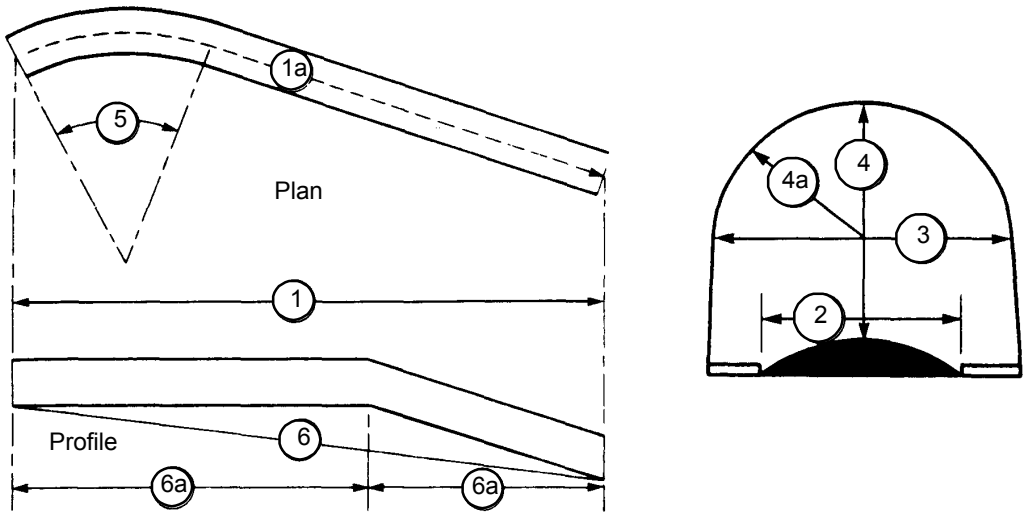


Figure 2-8. Sample Tunnel Reconnaissance Report, Reverse



1. Portal-to-portal tunnel length
1a. Centerline distance of tunnel
2. Effective traveled-way width, curb to curb
3. Horizontal clearance (minimum width of the tunnel bore measured at least 1.2 meters above the traveled way)
4. Overhead clearance (minimum distance between the top of the traveled way and the lower edge of the tunnel ceiling or any obstruction below the ceiling such as trolley wires or electric-light wires)
4a. Rise of tunnel arch (radius of curved portion)
5. Radius of curvature of the traveled way (either measured or estimated)
6. Gradient (percentage of rise of the traveled way between portals)
6a. Change in gradient within the tunnel (percentage of rise each way from the break of grade)

Figure 2-9. Tunnel Dimensions

PART B – FORD AND FERRY RECONNAISSANCE REPORTS

2-8. Ford Reconnaissance Report Form *(DA Form 1251).* When more detailed information is required concerning a specific ford, a *DA Form 1251 (Figures 2-10 and 2-11, pages 2-20 and 2-21)* is used. Information is recorded on the ford reconnaissance report as follows:

- **Items 1 through 10.** This information is self-explanatory. Enter all data that establishes positive identification of the ford (route, map sheet, grid reference, ford serial number, geographic location, and name of stream or crossing).

- **Item 11.** Record the width and depth of the crossing and the stream velocity at the present water level and at low, mean, and high levels. Also, give the date, the season, or the month(s) for each of these measurements. This information is normally determined from local records or by estimation of low- and high-water marks on the banks.

- **Items 12 through 17.** Record the composition of the stream bottom, the composition and percent of slope of both approaches, the pavement type (if any) of approaches and the ford, the usable width of approaches and the ford, and any hazards (such as flash floods or quicksand) that would affect the trafficability of the ford.

- **Item 18.** Enter any other pertinent data not recorded elsewhere on the report. This should include a description of approach roads, guide markers, depth gages, availability of and distances to bypasses and alternate crossings, and any other information that may assist in classifying the ford.

- **Items 19 and 20.** Draw sketches of the ford showing both a profile and a site plan. The profile sketch indicates the water level and the elevation of the stream bottom and approaches. The site plan gives the alignment of the ford and its approaches with appropriate dimensions *(Figure 2-11)*. Show terrain and other site features in the immediate area of both banks. Include a north arrow and the direction of stream flow.

- **Item 21.** Include any pertinent information not previously mentioned. Photograph the ford when it is reconnoitered, if possible. The photograph should show the banks, the approaches, and the stream in one view, and should be taken while a military vehicle is crossing (to give an indication of the water depth and the location of the ford).

FORD RECONNAISSANCE REPORT
For use of this form, see FM 5-170; proponent agency is TRADOC.

DATE: 9 Jul 02

TO: *(Headquarters ordering reconnaissance)*: CDR, ATTN: S-2, 3rd Eng Bn

FROM: *(Name, grade and unit of reconnaissance officer)*: Nicholas Graham, SFC, E co. 3rd Eng Bn

1. ROUTE NUMBER	2. FROM *(Initial Point)*	3. TO *(Terminal Point)*	4. DATE/TIME *(Of signature)*
F.S. 22	MT 25723029	MT 28933957	091550Jul02

5. MAP SERIES NUMBER	6. SHEET NUMBER	7. GRID REFERENCE		8. FORD NUMBER
		TYPE	COORDINATES	
P242	5221 II	1:50,000	MT26483428	F1

9. LOCATION FROM NEAREST TOWN			10. CROSSING *(Name of stream or other body of water)*
DISTANCE	DIRECTION	NAME OF NEAREST TOWN	
5 Km	NE	Richland Hill	Savannah River

11. CHARACTERISTICS OF CROSSING

WATER LEVELS	WIDTH	DEPTH	VELOCITY	DATE	SEASON OR MONTH(S)
TODAY	7.3m	.5m	1.5m/sec.	9Jul02	
LOW	6.1m	.3m	1.1m/sec.	28Aug01	
MEAN	7.3m	.5m	2m/sec.		
HIGH	8.4m	1.8m	22m/Sec	3Mar86	

12. BOTTOM: ☐ SAND ☐ GRAVEL ☐ STONE ☒ OTHER *(Specify)*: Concrete

13. APPROACHES: ☐ FIRM ☐ SOFT ☒ PAVED

14. SLOPE RATIO: 1:2

15. TYPE OF PAVEMENT: Bituminous

16. USABLE WIDTH: 7.3

17. HAZARDS *(Flash floods, quicksand, etc.)*: Unknown

18. REMARKS *(Description of Approach Roads, Guide Markers, Depth Gages, etc.)*

The bottom is concrete 7.3m Wide, 9.8m Long .5m Deep, with a velocity of 1.5m/Sec. There appears to be no seasonal limitations. Approaches on both banks are easy. River depth guages are present on both banks.

DA FORM 1251, JAN 55 USAPPC V1.00

Figure 2-10. Sample Ford Reconnaissance Report, Front

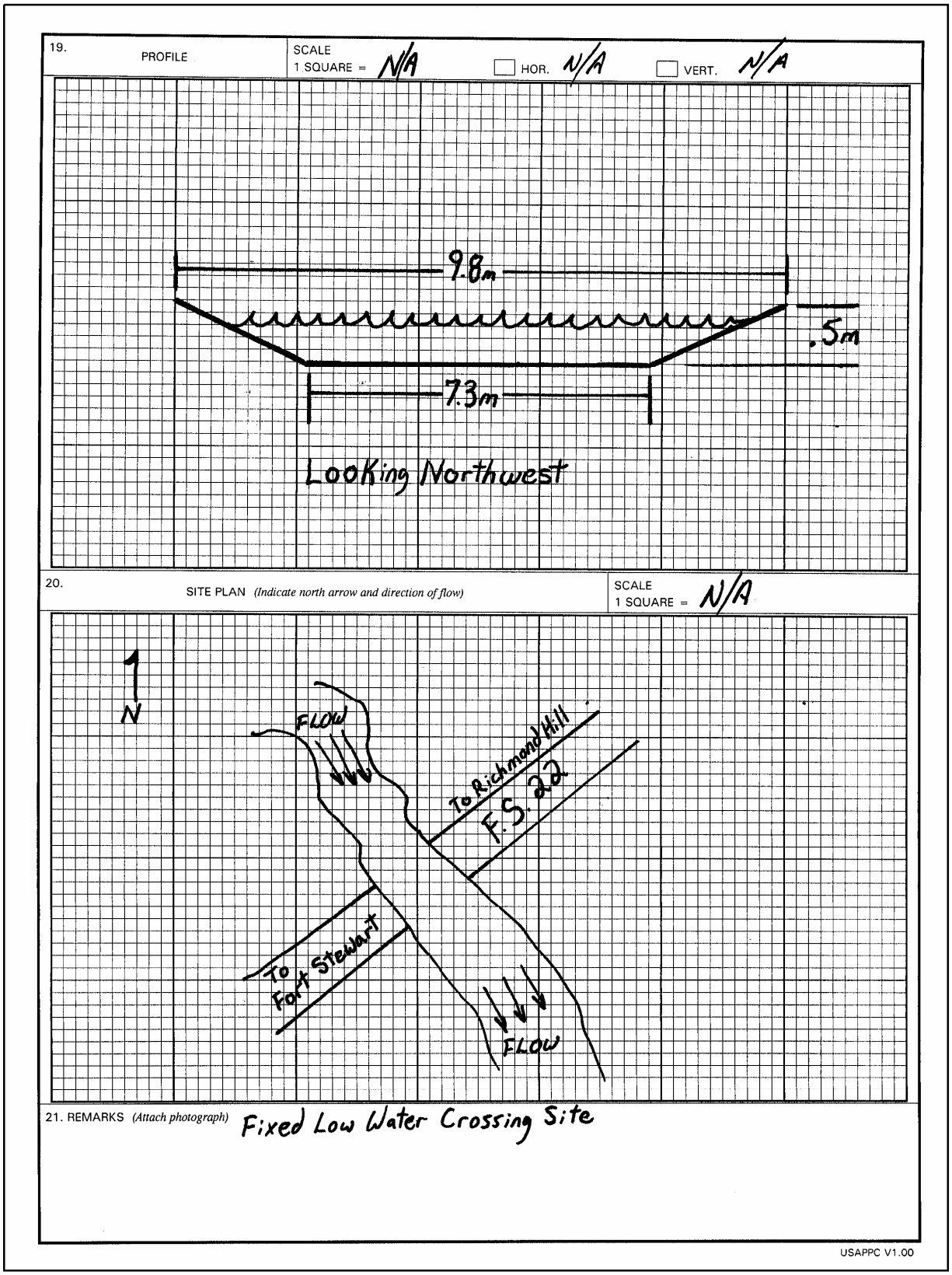


Figure 2-11. Sample Ford Reconnaissance Report, Reverse

2-9. Ferry Reconnaissance Report Form *(DA Form 1252).* When more detailed information is needed about a ferry or a ferry site, a *DA Form 1252 (Figure 2-12 and Figure 2-13, page 2-24)* is used to provide a permanent record of ferry information. Information is recorded on the ferry reconnaissance report as follows:

- **Items 1 through 11.** Enter all information that identifies the ferry by route, map sheet, grid reference, ferry serial number, classification, geographic location, and the name of the stream or body of water.

- **Item 12.** Enter any limiting features that could affect ferry operations (such as condition of vessels and terminals, floods, low water, freezing, and tides). Also, give seasons and dates for any limiting climatic conditions.

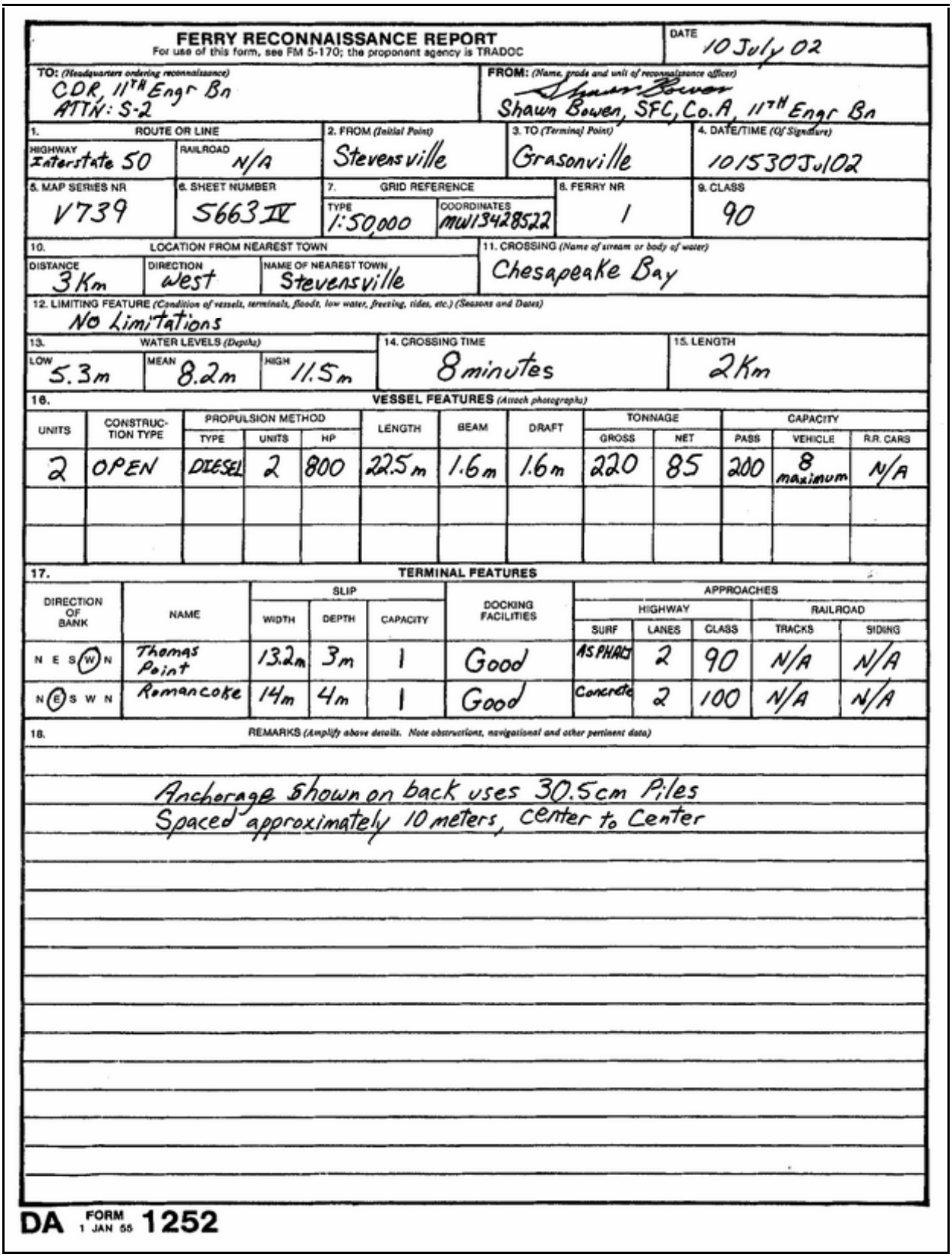
- **Items 13 through 15.** Record the depth of the stream or body of water at low, mean, and high water levels; the crossing time; and the length of the course.

- **Item 16.** Record the pertinent design features of the vessels used. This information includes the number; construction type; method and power of propulsion; length; beam; draft, gross, and net tonnage; and capacity of the vessels.

- **Item 17.** Designate the geographic direction of the banks by circling the appropriate abbreviations (N, E, S, W). Enter the name, the dimensions of the slips, specific docking approaches, the number of rail lines on or near the slip, and the number of sidings.

- **Item 18.** Enter facilities for transferring freight, and indicate those cases where railroad cars are loaded directly on the ferry. In addition, use this space to amplify details given in Items 1 through 17. Include obstructions, navigational aids, availability of and distances to alternate crossings, and other pertinent data not recorded elsewhere. To support the *DA Form 1252*, photographs should be taken of all ferries reconnoitered. These photographs should include the ferry site, the ferry slips, the ferryboats, and the approach routes. If the ferryboats are not self-propelled, the photographs should include auxiliary equipment (such as cables, towers, and winches).

- **Items 19 and 20.** Draw a sketch showing the route alignment plan and two sketches showing terminal views on both sides of the crossing. The route alignment plan should indicate the geographical course of the ferry, terminals, and approaches to the slips. Take particular care in recording instructions. Show navigational aids (such as buoys and lights). Make two separate sketches showing each terminal, including the geographical position of each bay and details of the slips, ramps, and bumper piles *(Figure 2-13).*



FERRY RECONNAISSANCE REPORT
For use of this form, see FM 5-170; the proponent agency is TRADOC

DATE: 10 July 02

TO: (Headquarters ordering reconnaissance): CDR, 11TH Engr Bn, ATTN: S-2

FROM: (Name, grade and unit of reconnaissance officer): Shawn Bowen, SFC, Co.A, 11TH Engr Bn

1. ROUTE OR LINE		2. FROM (Initial Point)	3. TO (Terminal Point)	4. DATE/TIME (Of Signature)
HIGHWAY: Interstate 50	RAILROAD: N/A	Stevensville	Grasonville	101530Jul02

5. MAP SERIES NR	6. SHEET NUMBER	7. GRID REFERENCE		8. FERRY NR	9. CLASS
		TYPE	COORDINATES		
V739	5663 IV	1:50,000	MW13428522	1	90

10. LOCATION FROM NEAREST TOWN			11. CROSSING (Name of stream or body of water)
DISTANCE: 3 Km	DIRECTION: West	NAME OF NEAREST TOWN: Stevensville	Chesapeake Bay

12. LIMITING FEATURE (Condition of vessels, terminals, floods, low water, freezing, tides, etc.) (Seasons and Dates): No Limitations

13. WATER LEVELS (Depths)			14. CROSSING TIME	15. LENGTH
LOW: 5.3m	MEAN: 8.2m	HIGH: 11.5m	8 minutes	2Km

16. VESSEL FEATURES (Attach photographs)

UNITS	CONSTRUCTION TYPE	PROPULSION METHOD			LENGTH	BEAM	DRAFT	TONNAGE		CAPACITY		
		TYPE	UNITS	HP				GROSS	NET	PASS	VEHICLE	R.R. CARS
2	OPEN	DIESEL	2	800	22.5m	1.6m	1.6m	220	85	200	8 maximum	N/A

17. TERMINAL FEATURES

DIRECTION OF BANK	NAME	SLIP			DOCKING FACILITIES	APPROACHES				
		WIDTH	DEPTH	CAPACITY		HIGHWAY			RAILROAD	
						SURF	LANES	CLASS	TRACKS	SIDING
N E S (W) N	Thomas Point	132m	3m	1	Good	ASPHALT	2	90	N/A	N/A
N (E) S W N	Romancoke	14m	4m	1	Good	Concrete	2	100	N/A	N/A

18. REMARKS (Amplify above details. Note obstructions, navigational and other pertinent data)

Anchorage shown on back uses 30.5cm Piles
Spaced approximately 10 meters, center to Center

DA FORM 1 JAN 55 1252

Figure 2-12. Sample Ferry Reconnaissance Report, Front

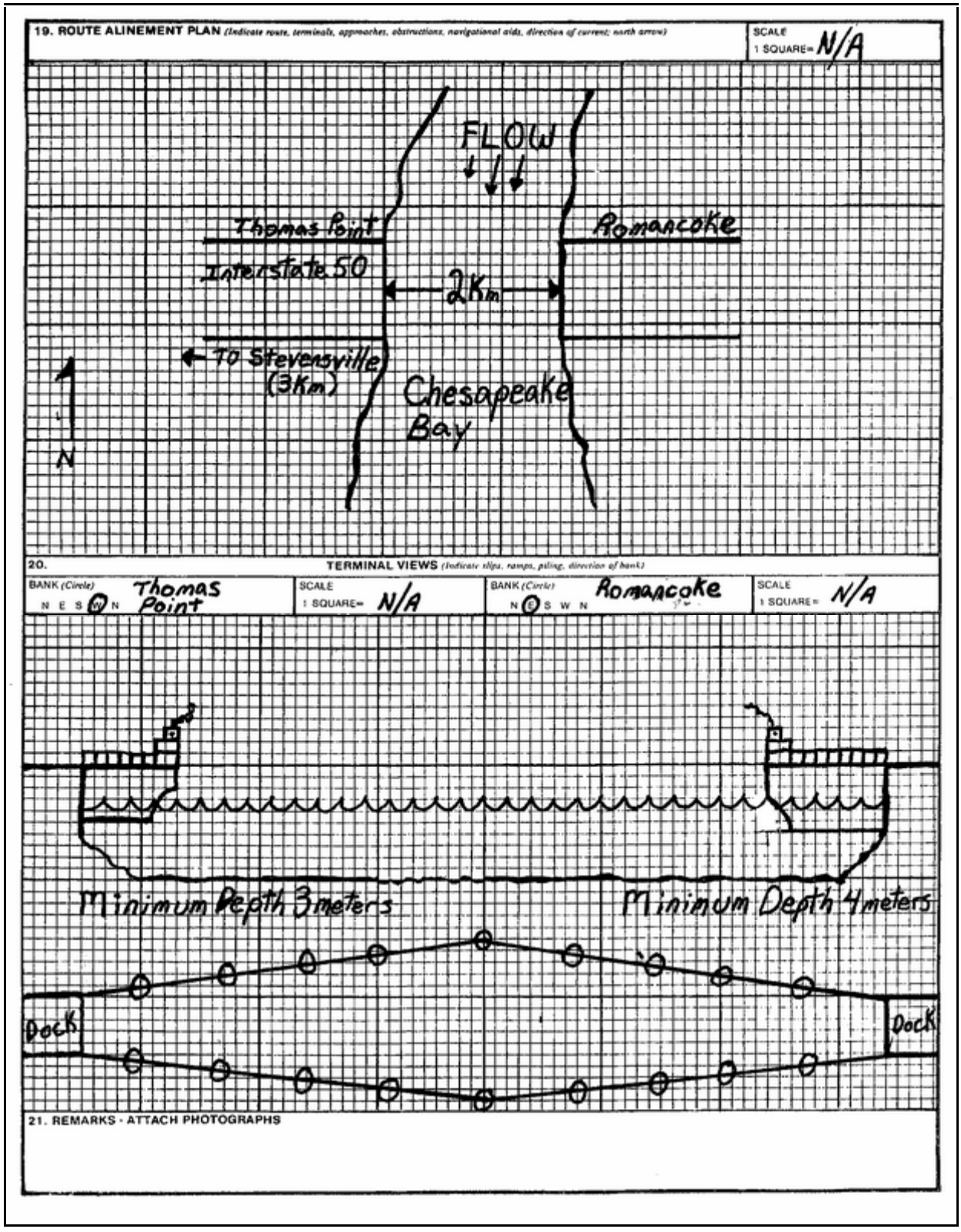


Figure 2-13. Sample Ferry Reconnaissance Report, Reverse

PART C – ENGINEER RECONNAISSANCE REPORTS

Engineer reconnaissance is terrain reconnaissance that is conducted to support engineer activities. A special engineer reconnaissance obtains more detailed information regarding specific engineer tasks. Reconnaissance personnel use a *DA Form 1711-R* to record an engineer reconnaissance.

2-10. Symbols. Engineer resource symbols have been standardized to represent the more common engineer resources and construction materials *(Figure 2-14 and Figure 2-15, page 26)*. In those cases where a symbol fails to provide an adequate explanation on the overlay, the symbol is referenced and fully described on the *DA Form 1711-R*.

Figure 2-14. Engineer Resource Symbols (1 of 2)

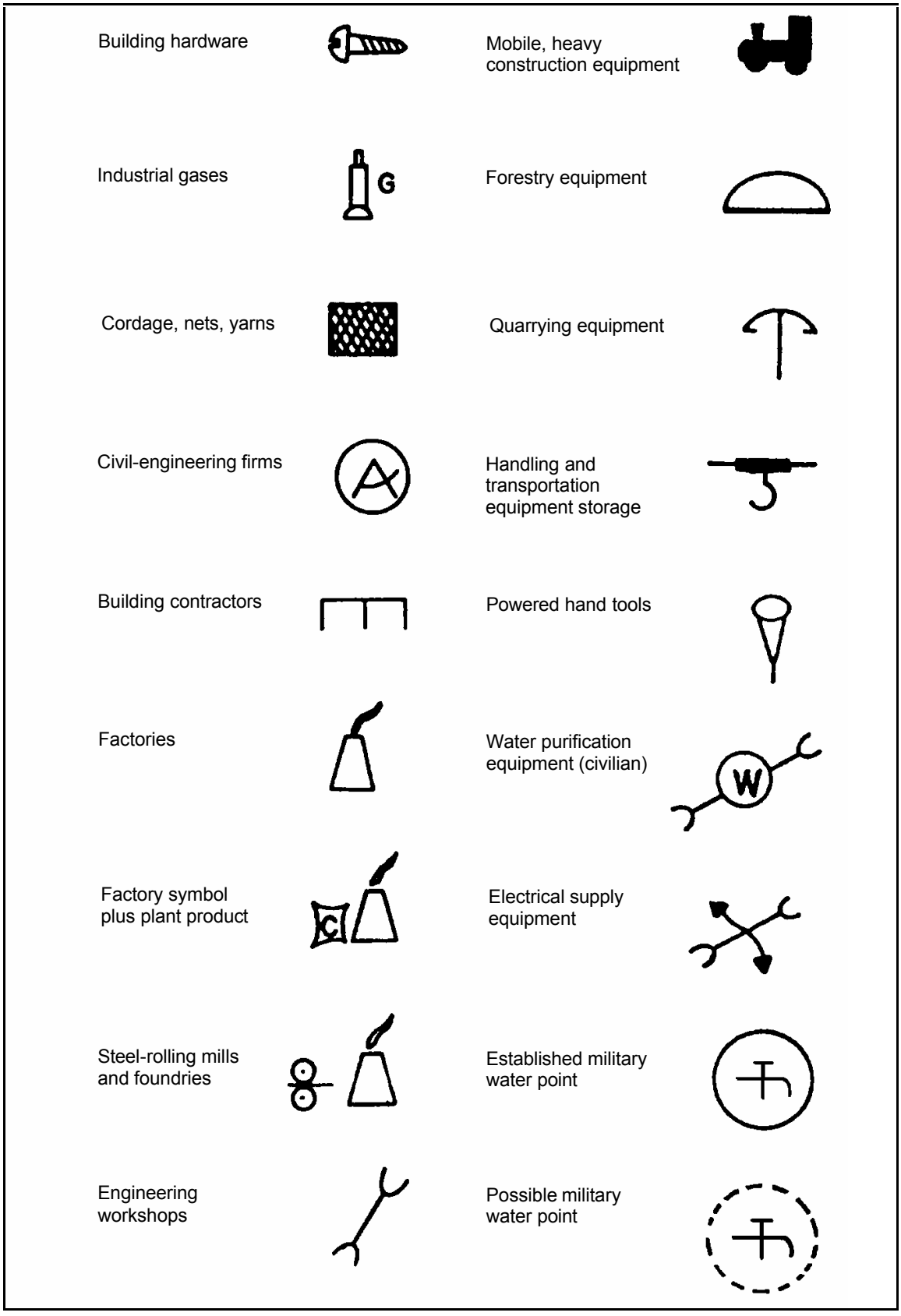


Figure 2-15. Engineer Resource Symbols (2 of 2)

2-11. Critical Points. Critical point symbols *(Figure 2-16)* are used on an overlay in conjunction with engineer resource symbols to show features not adequately covered by other symbols. Number (in order) and describe any critical points on the *DA Form 1711-R*.

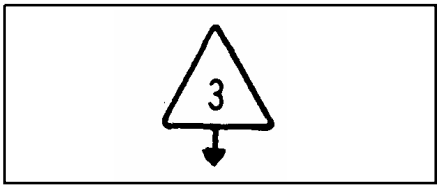


Figure 2-16. Critical Point Symbol

2-12. Engineer Reconnaissance Report Form. The *DA Form 1711-R (Figures 2-17 and 2-18, pages 2-28 and 2-29)* is used to report those items of engineer reconnaissance not adequately covered by the DA report forms previously discussed. This form is required for both a hasty and a deliberate reconnaissance. The engineer reconnaissance form is used with a reconnaissance overlay to provide a convenient and uniform way for reporting the results of an engineer reconnaissance. The information is recorded on the form as follows:

- The heading information is self-explanatory and identifies who conducted the reconnaissance and when and where it was conducted.
- The "key" column refers to an item of the report and its corresponding location on the reconnaissance overlay. The critical point number of the object is entered in this column.
- The "object" column shows the object being explained. A conventional symbol or a brief written description is entered.
- The "time-observed" column shows the DTG of observation.
- The "work-estimate" column will state "yes" if a work estimate is included and "no" if a work estimate is not included. Work estimates are not required for a hasty route reconnaissance.
- The "additional-remarks" column is used to report the location of the object (by grid coordinates), followed by explanatory remarks, calculations, and an appropriate sketch. This information should be as detailed as possible to alleviate the requirement for an additional reconnaissance.
- The authentication blocks contain the company commander's identification and signature.
- Any work estimates appear on the reverse side of the form and are used to indicate the amount and type of engineer effort required for construction or repair. Critical point numbers for each work estimate identify the appropriate object on the front side. Only those columns that are applicable are completed. Additional sketches may be drawn to better explain the type of work required.

ENGINEER RECONNAISSANCE REPORT
For use of this form, see FM 5-170; proponent agency is TRADOC.

PAGE 1 OF 1 PAGES

TO: Commander, 307TH Engr Bn
ATTN: S-2

FROM: CDR, Co D, 307TH Engr Bn

FILE NO.

REPORT NO. 1

PARTY LEADER *(Name, Grade, Unit)*: Robert Casteel, SFC
1/O/307TH Engr Bn

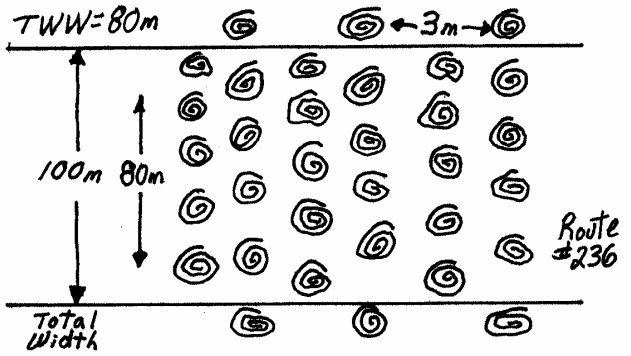
PLACE, HOUR, DATE: MW432567
1100 17 July 02

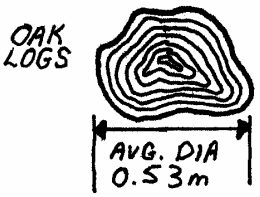
MAPS: Fort Leonard Wood Special Sheet 5261 III

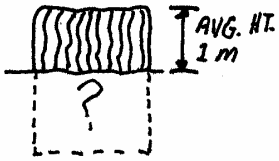
SCALE: 1:50,000

DELIVER TO *(Organization, place, hour and date)*: S-2, 307TH Engr Bn, MW 301422, 1300 17 Jul 02

KEY	OBJECT	TIME OBSERVED	WORK ESTIMATE	ADDITIONAL REMARKS AND SKETCH
1		0545	Yes	MW57930164 - Log Post Obstacle 33 Logs @ 1.5 meters center to center on all sides, Obstacle not defended, booby trap check revealed no booby traps. By-Pass: Impossible







Engineer Work Estimate on Reverse Side.

TYPED NAME, GRADE, ORGANIZATION: Karin K. Gan, CPT
Co D, 307TH Engr Bn

SIGNATURE: Karin K. Gan

DA FORM 1711-R, MAY 85 EDITION OF JUN 61 IS OBOLETE USAPPC V1.00

Figure 2-17. Sample Engineer Reconnaissance Report

ENGINEER WORK ESTIMATE

LOCATION KEY	DESCRIPTION OF WORK	UNIT REQUIRED	NO. REQUIRED HOURS	EQUIPMENT			MATERIALS		
				TYPE	NO.	HOURS	TYPE	UNIT	QUANTITY
1	Remove Log Posts Obstacle From Route 236	1 sqd.	2	1-Demo Set	1	2	TNT	lb.	297
				D-7 Dozer	1	2	Det. Cord	Ft.	1100
							Non-Elec. Caps	ea.	2
							Time Fuse	ft.	3
							M-81 Fuse		

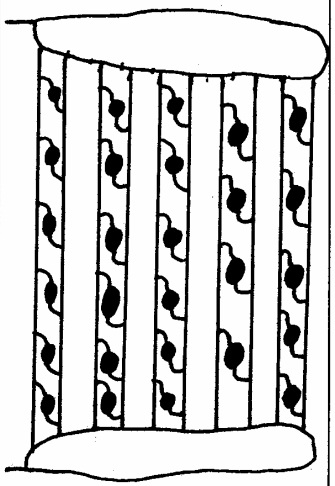
D = (.53m)(39.37)
= 20.8 inches

$P = \frac{D^2}{40} = \frac{20.8^2}{40}$

P = 10.8

11 pkgs/log =

297 pkg/TNT



Dual-Primed
Dual-Initiated
Firing System

Reconnaissance Report on Reverse Side.

REVERSE, DA FORM 1711-R, MAY 85

USAPPC V1.00

Figure 2-18. Sample Engineer Reconnaissance Report, Reverse

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LESSON 2

PRACTICE EXERCISE

The following items will test your grasp of the material covered in this lesson. There is only one correct answer to each item. When you complete the exercise, check your answers with the answer key that follows. If you answered any item incorrectly, study again that part of the lesson which contains the portion involved.

1. A completed road reconnaissance identified no limiting characteristics. What is the first symbol used in the road classification formula?

   A. A
   B. B
   C. B c
   D. AB

2. What section of a road reconnaissance report includes detailed road information?

   A. I
   B. II
   C. III
   D. IV

3. When completing column 8 on a bridge reconnaissance report, what symbol is used to note that a span is unusable due to damage?

   A. ∞
   B. #
   C. W
   D. (OB)

4. Where on a ferry reconnaissance report would navigational aids be shown?

   A. Item 15
   B. Item 17
   C. Item 18
   D. Item 20

5. An engineer reconnaissance report is required for what type(s) of reconnaissance?

A. General
B. Hasty
C. Deliberate
D. Both hasty and deliberate

6. If a work estimate is included as part of an engineer reconnaissance report, what is entered in the work-estimate column?

A. Yes
B. No
C. Equipment needed
D. Man-hours required

7. Who must sign the authentication block at the bottom of an engineer reconnaissance report?

A. The person who performed the reconnaissance
B. The reconnaissance team leader
C. The company commander
D. The platoon leader

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LESSON 2

PRACTICE EXERCISE

ANSWER KEY AND FEEDBACK

Item		Correct Answer and Feedback
1.	A.	A (paragraph 2-2a, page 2-2)
2.	B.	II (paragraph 2-1b, page 2-2)
3.	B.	# (paragraph 2-3i, page 2-7)
4.	D.	Item 20 (paragraph 2-9, page 2-22)
5.	D	(paragraph 2-12, page 2-27)
6.	A	(paragraph 2-12, page 2-27)
7.	C	(paragraph 2-12, age 2-27)

APPENDIX A

LIST OF COMMON ACRONYMS

∞	symbol for infinity
♂	symbol for rounding the answer to the next higher whole number
ACCP	Army Correspondence Course Program
AIPD	Army Institute for Professional Development
AMEDD	Army Medical Department
APO	Air Post Office
approx	approximately
attn	attention
Aug	August
AUTOVON	automatic voice network
AV	automatic voice network
avg	average
AWR	answer weight reference
bn	battalion
cdr	commander
cm	centimeter(s)
co	company
CPT	captain
D	Drummond; diameter
DA	Department of Army
det	detonation
dia	diameter

DINFOS	Defense Information School
DSN	Defense Switched Network
DTG	date time group
E	east
ea	each
elec	electric
EN	engineer
eng	engineer
engr	engineer
etc	et cetera
F	ford
FM	field manual; frequency modulated
FS	Fort Stewart
ft	feet; foot; fort
hor	horizontal
ht	height
in	inch(es)
IPD	Institute for Professional Development
Jan	January
JFK	John Fitzgerald Kennedy
Jul	July
Jun	June
K	Kenneth
km	kilometer(s)
LARS	left = add/right = subtract
lb	pound(s)

m	meter(s)
MANSCEN	Maneuver Support Center
Mar	March
MI	middle initial
MLC	military load classification
MO	Missouri
MOS	military occupational specialty
N	north
N/A	not applicable
NCO	noncommissioned officer
NE	northeast
No.	number
OB	obstruction(s)
oc	on center
P	pound(s)
pkg	package
plt	platoon
RCOAC	Reserve Component Officer Advanced Course
reg	regulation
rr	railroad
RS	response sheet
RYE	retirement year ending
S	south
S2	Intelligence Officer (United States Army)
sec	second
SFC	sergeant first class

SGT	sergeant
SM	soldier's manual
sqd	squad
sq ft	square foot; square feet
SSN	social security number
st	street
STANAG	standardization agreement
STP	soldier's training publication
T	tunnel
temp	temperature
TG	trainer's guide
TM	technical manual
TNT	trinitrotoluene
TRADOC	United States Army Training and Doctrine Command
TWW	traveled-way width
US	United States
USA	United States of America
USAPPC	United States Army Publications & Printing Command
USC	United States Code
UTM	universal transverse Mercator
V	version
VA	Virginia
VC	vehicular clearance
vert	vertical
W	west

APPENDIX B

RECOMMENDED READING LIST

The following publications provide additional information about the material in this subcourse. You do not need these materials to complete this subcourse.

DA Form 1248. *Road Reconnaissance Report.* 1 July 1960.

DA Form 1249. *Bridge Reconnaissance Report*. 1 July 1960.

DA Form 1250. *Tunnel Reconnaissance Report.* 1 January 1955.

DA Form 1251. *Ford Reconnaissance Report.* 1 January 1955.

DA Form 1252. *Ferry Reconnaissance Report.* 1 January 1955.

DA Form 1711-R. *Engineer Reconnaissance Report.* 1 May 1985.

FM 5-34. *Engineer Field Data.* 30 August 1999.

FM 5-34.343. *Military Nonstandard Fixed Bridging.* 12 February 2002.

FM 5-170. *Engineer Reconnaissance.* 5 May 1998.

FM 5-250. *Explosives and Demolitions.* 30 July 1998.

FM 101-5-1. *Operational Terms and Graphics.* 30 September 1997.

STP 5-12B24-SM-TG. *Soldier's Manual, Skill Levels 2/3/4 and Trainer's Guide, MOS 12B, Combat Engineer.* 12 December 1990.

STANAG 2253. *Roads and Road Structures.* 17 May 2000.

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APPENDIX C

METRIC CONVERSION CHART

This appendix complies with current Army directives, which state that the metric system will be incorporated into all new publications. *Table C-1* is a metric conversion chart.

Table C-1. Metric Conversion Chart

US Units	Multiplied By	Equals Metric Units	Metric Units	Multiplied By	Equals US Units
Length					
Inches	25.4001	Millimeters	Millimeters	0.03937	Inches
Inches	2.5400	Centimeters	Centimeters	0.39370	Inches
Feet	0.3048	Meters	Meters	3.28100	Feet
Miles	1.6093	Kilometers	Kilometers	0.62137	Miles
Yards	0.9140	Meters	Meters	1.09360	Yards
Area					
Square feet	0.0929	Square meters	Square meters	10.7640	Square feet
Square inches	6.4516	Square centimeters	Square centimeters	0.1550	Square inches
Square miles (statute)	2.5900	Square Kilometers	Square kilometers	0.3861	Square miles (statute)
Fluid ounces	29.5730	Milliliters	Milliliters	0.03380	Fluid ounces
Weight					
Pounds	0.45360	Kilograms	Kilograms	2.20460	Pounds

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TRADOC REG 350-33

FIRST ENTER YOUR SCHOOL CODE HERE				SEE INSIDE BACK COVER FOR INSTRUCTIONS ON WHERE TO LOCATE YOUR SCHOOL CODE.
FILL IN YOUR NAME AND COMPLETE MAILING ADDRESS BELOW AND ON REVERSE SIDE.				
LAST, FIRST, MI.	RANK	SOCIAL SECURITY NUMBER	*SEE PRIVACY ACT STATEMENT AT BOTTOM OF THIS PAGE	
ADDRESS FAILURE TO SUBMIT YOUR CORRECT COMPLETE MAILING ADDRESS WILL PREVENT EXPEDITIOUS HANDLING OF YOUR INQUIRY. ZIP CODE			PHONE NUMBER COMMERCIAL AV	

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- ☐ Subcourse Reissue
- ☐ Enrollment Extension

PROBLEMS WITH--

- ☐ Exam Response Sheet
- ☐ Enrollment
- ☐ Incorrect SSN
- ☐ Incorrect RYE Data
- ☐ OTHER

CHANGE IN--

- ☐ Address
- ☐ Unit
- ☐ Rank or Grade

COMMENTS:

Please use this area to write your inquiry and feel free to add comments on a separate sheet of paper if necessary.

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AUTHORITY:	1OUSC3012(B) and (G)
PURPOSE:	To provide Army Correspondence Course Program students a means to submit inquiries and comments.
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STUDENT SUBCOURSE CONTENT INQUIRY FORM
TRADOC REG 350-33

FIRST ENTER YOUR SCHOOL CODE HERE ☐☐☐ SEE INSIDE BACK COVER FOR INSTRUCTIONS ON WHERE TO LOCATE YOUR SCHOOL CODE.

FILL IN YOUR NAME AND COMPLETE MAILING ADDRESS BELOW AND ON REVERSE SIDE.

LAST, FIRST, MI.	RANK	SOCIAL SECURITY NUMBER *SEE PRIVACY ACT STATEMENT AT BOTTOM OF THIS PAGE

SUBCOURSE TITLE	SUBCOURSE NUMBER	EDITION
Conduct Reconnaissance Part II	**EN 5622**	**A**

ADDRESS FAILURE TO SUBMIT YOUR CORRECT COMPLETE MAILING ADDRESS WILL PREVENT EXPEDITIOUS HANDLING OF YOUR INQUIRY. ZIP CODE	PHONE NUMBER COMMERCIAL AV

So that we can spend more time researching your inquiry, and less time handling your inquiry form, check your inquiry area(s).

LESSON OR EXAM IN ERROR WITH-- CONFUSING CONTENT--

☐ Field Manual Procedure ☐ Doctrine ☐ Example ☐ Organization ☐ Wording
☐ Technical Manual Procedure ☐ Equipment Specification ☐ Situation ☐ Illustration ☐ Chart
☐ Figure ☐ Table ☐ Other

COMMENTS:

Please use this area to write your inquiry and feel free to add comments on a separate sheet of paper if necessary. Be specific and cite paragraphs, pages and/or figure numbers.

SCHOOL REPLY:

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AUTHORITY: 1OUSC3012(B) and (G)
PURPOSE: To provide Army Correspondence Course Program students a means to submit inquiries and comments.
ROUTINE USES: To locate and make necessary changes to student records.
DISCLOSURE: VOLUNTARY. Failure to submit SSN will prevent subcourse authors at service schools from accessing student records and responding to inquiries requiring such follow-up.

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US Army Engineer School
Attn: ATZT-DT-WR-E
320 MANSCEN Loop, Suite 246
Fort Leonard Wood, MO 65473-8929

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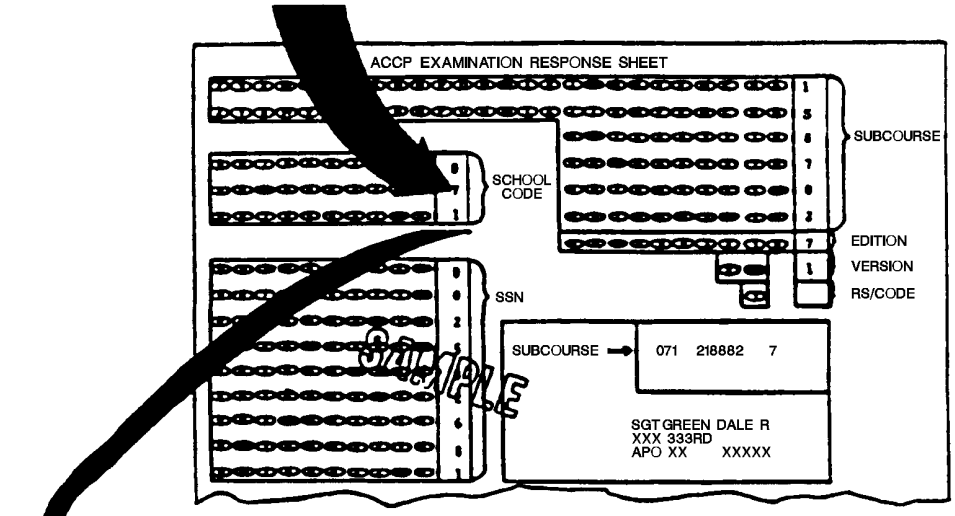
BEFORE YOU PHONE.....

1. CHECK THE SCHOOL CODE ON YOUR ACCP EXAMINATION RESPONSE SHEET.



2. FIND YOUR SCHOOL CODE, PROGRAM, AND EXTENSION BELOW.
3. CALL YOUR STUDENT SERVICES COUNSELOR AT THE ARMY INSTITUTE OF PROFESSIONAL DEVELOPMENT BY DIALING COMMERCIAL (804) 878 + EXTENSION (IS NOT TOLL FREE) OR AUTOVON 927 + EXTENSION.

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STUDENT SERVICES COUNSELOR EXTENSIONS BY PROGRAM AND SCHOOL CODE

SCHOOL CODE	PROGRAM	EXTENSION
441	AIR DEFENSE	2079
886	AMEDD RCOAC, PHASE 1	2127
171	ARMOR	2079
011	AVIATION	5410
552	AVIATION LOGISTICS	2127
161	CHAPLAIN	3335
031	CHEMICAL	5442
886	COMBAT LIFESAVER COURSE	2127
999	DEFENSE SECURITY INSTITUTE	2169
051	ENGINEER	2127
887	FACILITIES ENGINEERING MANAGEMENT COURSE	2079
061	FIELD ARTILLERY	2079
887	HUMAN FACTORS ENGINEERING	2079
071	INFANTRY	5715
906	INTELLIGENCE (DEVENS)	2079
301	INTELLIGENCE (HUACHUCA)	2079
331	JFK SPECIAL WARFARE CENTER	3322
191	MILITARY POLICE	5442
093	MISSILE AND MUNITIONS	5442
121	MUSIC	3335
091	ORDNANCE	5442
214	PUBLIC AFFAIRS PROPONENT AGENCY (DINFOS)	5410
101	QUARTERMASTER	3322
113	SIGNAL	5410
121	SOLDIER SUPPORT INSTITUTE	3335
551	TRANSPORTATION	2127
999	INDIVIDUAL SUBCOURSE PROGRAM	2169

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